VII. ON FURTHER COLLECTIONS OF FISHES FROM PARAGUAY.[1]

By Carl H. Eigenmann assisted by Waldo Lee McAtee and David Perkins Ward.

The fresh-water fish fauna of tropical America is by far the richest in the world. It comprises about one tenth of all known fishes. It is entirely distinct from the North American fauna and from the Patagonian fauna. Its center of greatest diversity lies in the Amazons about the mouth of the Rio Negro. From this point it becomes attenuated northward until it reaches the vanishing point on the borders of the United States. Southward it extends on the eastern slope to somewhere, no one knows exactly where, south of Buenos Aires. On the western slope it does not extend so far south.

The key to the great diversity of the tropical American fauna is to be found in the enormous single water system extending from 10° north to 35° south latitude, and from 50° to 79° west longitude, providing a continuous north and south water-way of more than 3,000 miles and an east and west course of over 2,000 miles. It embraces the basin of the Orinoco, the basin of the Amazons, and the basin of the La Plata, draining over 3,000,000 square miles of territory, or an area about equal to that of the entire United States, exclusive of dependencies. It has long been known that the Orinoco and the Amazons are connected by the Cassiquiare, the waters of which at times flow one way, at times another. The following is from the "United States of Brazil" issued by the Bureau of American Republics.

"Another remarkable phenomenon of the Paraguay is the mingling of its principal head waters with those of the affluents of the Amazon. An affluent of the Jaurú River is sufficiently near the Guaporé River to be connected with the latter by a canal. The Aguapehy, another tributary of this river, is separated from the Alegre by a narrow isthmus 5 kilometers wide. In the eighteenth century an attempt was made to open up a canal here, and owing to the abundant rains a large canoe of twelve oars succeeded in passing from the one river to the other. One of the governors of the State also endeavored to open up a canal

[1] Contributions from the Zoölogical Laboratory of Indiana University, No. 65.

10 kilometers long in another part of the isthmus, but on account of the small amount of trade it was never completed. This would connect Montevideo and Para by a continental waterway 8,300 kilometers long. In the near future it is probable that railways will take the place of the canal. There are many places on the edge of the plateau, farther to the east, where a simple cut of a few meters would connect the tributaries of the Amazon with those of the Paraguay, transforming eastern Brazil into an island. There is a space of but 100 meters between the Estivado, a small tributary of the Tapajoz, and the Tombador, which empties into the Cuyaba."

In 1891 [2] I called attention to the great similarity of the faunæ of the La Plata and the Amazons. The former was at that time known to differ from the latter by negative characters only. At the same time I called attention to the radical difference between the fauna of the La Plata and the Amazons and the fauna of the coastal streams that empty into the Atlantic between these two great rivers.

Every additional collection from the Paraguay, and indeed from the entire system of the La Plata, tends to emphasize the similarity of its fauna with that of the Amazons.

The interest that centers in the Paraguayan fauna becomes apparent from the above considerations. It is through the basin of the Paraguay that the La Plata has probably received its Amazonian character. For this reason accurate representations of the members of the fauna are greatly desired and an attempt has been made to supply these in the photographs of a number of actual Paraguayan specimens which accompany this paper.

The basin of the Paraguay approaches in area the basin of the Ohio plus that portion of the basin of the Mississippi north of the entrance of the Ohio and exclusive of the basin of the Missouri River. The area then is very large. The means of communication for the most part are primitive, and probably but a fraction of the fauna is known. Two hundred and fifty-four species have been recorded from this basin. The regions that will probably yield the richest rewards in the future are the mountain brooks and pools of central Paraguay, the ponds of the Chaco, and the mountain sources of the Pilcomayo. In the *Proceedings* of the Philadelphia Academy of Sciences for 1903, pp. 497–537, Eigenmann and Kennedy reported on a collection of fishes made by Professor J. Daniel Anisits in the basin of the Paraguay.

[2] *Proc. U. S. Nat. Mus.*, Vol. XIV., pp. 1 et seq., 1891.

Professor Anisits has made further collections of the fresh-water fishes of the basin of the Paraguay which were sent to Indiana University for identification. By these collections several new species and new genera are added to the South American fauna, the known distribution of many species is extended, and what is, perhaps, of most importance, the South American fauna is rid of a number of nominal species, which have been relegated to synonymy. The collections of Professor Anisits are the most important and extensive which have been made in the basin of the Paraguay, and his energy and enthusiasm, together with his great care in the preservation and labelling of his specimens, promise to make the basin of the Paraguay ichthyologically among the best known regions of the neotropical realm.

Of particular interest in the present collection are the new species of *Dysichthys*, the only other species of which came from the Peruvian Amazon, and *Homodiætus*, a new genus of Stegophilini, some of the species of which live in the gill-cavities of the larger Siluroids.

The following localities are represented in the collections:

1. Rio Paraguay at Porto or Puerto Murtinho, Tuyuyu, and Corumba in Matto Grosso.
2. Rio Otuguis, a western tributary of the Paraguay in Paraguay near the boundary of Bolivia.
3. Bahia Negra on the west bank of the Paraguay in northern Paraguay.
4. Puerto Max in the lime region of Paraguay.
5. Tributary of the Paraguay in the Chaco Paraguayo.
6. Ipané-Tuya on the Paraguay.
7. Rio Paraguay and Laguna Pasito at Ascuncion.
8. Rio Negro, a tributary of the Paraguay opposite Ascuncion.
9. Laguna Ipacaray.
10. Mountain brooks at Sapucay, Central Paraguay.
11. Villa Rica, and a small brook of Colonia Gonzales.

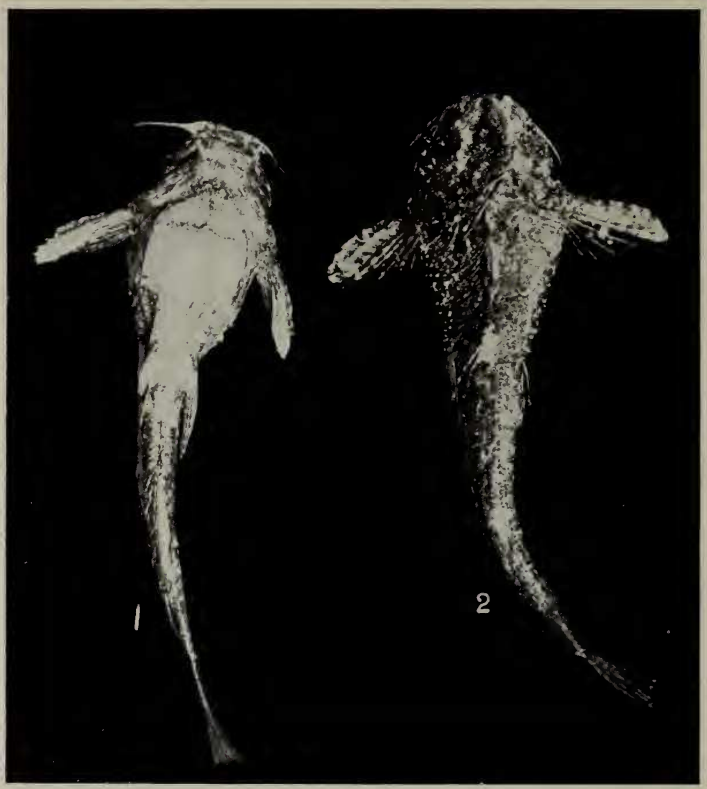
The types of new species are in the collections of Indiana University. A full set of cotypes are contained in the collections of the Carnegie Museum.

BUNOCEPHALIDÆ.

1. *Bunocephalus rugosus* Eigenmann and Kennedy.

One specimen from Corumba (322).[3]

[3] Professor Anisits' collector's number.



Figs. 1-2. *Dysichthys australe* Eigenmann and Ward. (Type.)
Ventral and dorsal views.

2. *Bunocephalus doriæ* Boulenger.

Two specimens from small brooks at Villa Rica (464); another from the Laguna Pasito (462).

3. *Dysichthys australe* Eigenmann and Ward, sp. nov. (Plate XXXI.)

Type No. 10123, one specimen, 28 mm. long from Corumba (317). Cotypes, No. 10124, ten specimens from Corumba (317). This species may be distinguished from *Dysichthys coracoideus*, the only other species of the genus, as follows:

a. First dorsal ray a little nearer tip of snout than base of caudal; maxillary barbels reaching to base of pectorals. D.I,5..... .... *coracoideus.*

aa. Distance of first dorsal ray from base of caudal one and one half times as great as its distance from tip of snout; maxillary barbels not reaching to base of pectorals; D.I,4..... *australe.*

Body slender, its greatest width at base of pectorals, 3¼ in the length; depth at origin of dorsal 6 in the length; head depressed; snout rounded; two ridges diverging from near the central portion of the snout, running backward above the eye, meeting again to form the nuchal crest, leaving a diamond-shaped depression between the ridges; nuchal crest continued back to base of dorsal fin; a crest on each side beginning at the operculum and running parallel with the lateral and nuchal crests; the ridges and knobs of the head well developed; interorbital space very concave; the part of crest bounding the orbit especially strong; a knob before and another behind the eye. The eyes placed almost laterally below the ridges; eye 1½ in the snout, 7 in the head, 3 in the interorbital; maxillary barbels not reaching to base of pectorals by ¼ of their length.

Coracoid processes parallel behind, their length 2 in the distance between them. Humeral processes slightly shorter; skin everywhere covered with very conspicuous papillæ, those on the sides of the body arranged in about seven rows; distance of dorsal fin from tip of snout 2½ times in the length; pectoral spine armed on both sides with long hooks. Dark brown, speckled with lighter; fins light brown; belly speckled with white; head 5; depth 6; width 3¼; D.I,4; P.I, 4; V. 6; A. 7; C. 10.

The only other species of this genus was described by Cope from Nauta on the Marañon about 2,000 miles from the present locality.

SILURIDÆ.

4. *Rhamdia quelen* (Quoy and Gaimard).

One specimen from Corumba (335).

5 *Pimelodella gracilis* (Valenciennes) (Plate XXXII., Fig. 2).

One specimen from Corumba (352), and another from Laguna Ipacarai (450).

6. *Pimelodella lateristriga* (Müller and Troschel).

Seven specimens from Villa Rica (469).

7. *Pimelodella mucosa* Eigenmann and Ward sp. nov. (Plate XXXII., Fig. 1).

Type No. 10125. One specimen from Bahia Negra (399). This species is most nearly allied to *P. eigenmanni* and *buckleyi* from which it may be distinguished as follows:

a. Lower caudal lobe the longer.

b. Maxillary barbel reaching to middle of caudal; postmental barbel to middle of pectoral spine; pectoral spine curved, with about fifteen straight, feeble spines on its posterior surface, anterior surface with minute denticulations along basal part and feeble recurved hooks near its tip, 1¼ in the head. *mucosa*.

aa. Upper caudal lobe the longer.

c. Maxillary barbel reaching beyond origin of anal; postmental about to middle of pectorals; pectoral spine as long as the distance between base of maxillary barbel and the opercular border, its inner edge distinctly though feebly serrate; adipose dorsal 3⅔ to 4 in the length.....*eigenmanni*.

cc. Maxillary barbel reaching to origin of anal; postmental to tip of pectoral; pectoral spine as long as the distance from the anterior border of eye to the opercular margin, practically smooth on its inner edge; adipose fin a little more than ⅓ in the total length.....*buckleyi*.

Body compressed posteriorly; head sub-conical, depressed in front, its width 1⅓ in its length, its depth at the base of occipital process 1½, its width at the angle of the mouth 2⅔ in the head; occipital process rather slender, its width at base 2¾ in its length; maxillary barbel reaching to middle of caudal; mental barbel to operculum; postmental to middle of pectoral. Gill-membranes separate to below anterior margin of eye; very conspicuous pits along either side of the lower surface of the head. Eye 1⅖ in the snout, 3½ in the head, 1¼ in interorbital, slightly nearer to posterior margin of operculum than to snout. Dorsal spine equidistant from snout and anal; its highest rays equal in height to the head in length. Adipose dorsal 3½ in the length, its distance from the dorsal fin being 1⅓ in the length of the latter. Caudal long and deeply forked, the lower lobe wider and longer than the upper, 3½ in the length. Anal rounded, its longest ray 1⅘ in the head. Ventrals inserted on a vertical line with fourth dorsal ray, 1½ in length of head; pectoral spine 1¼ in

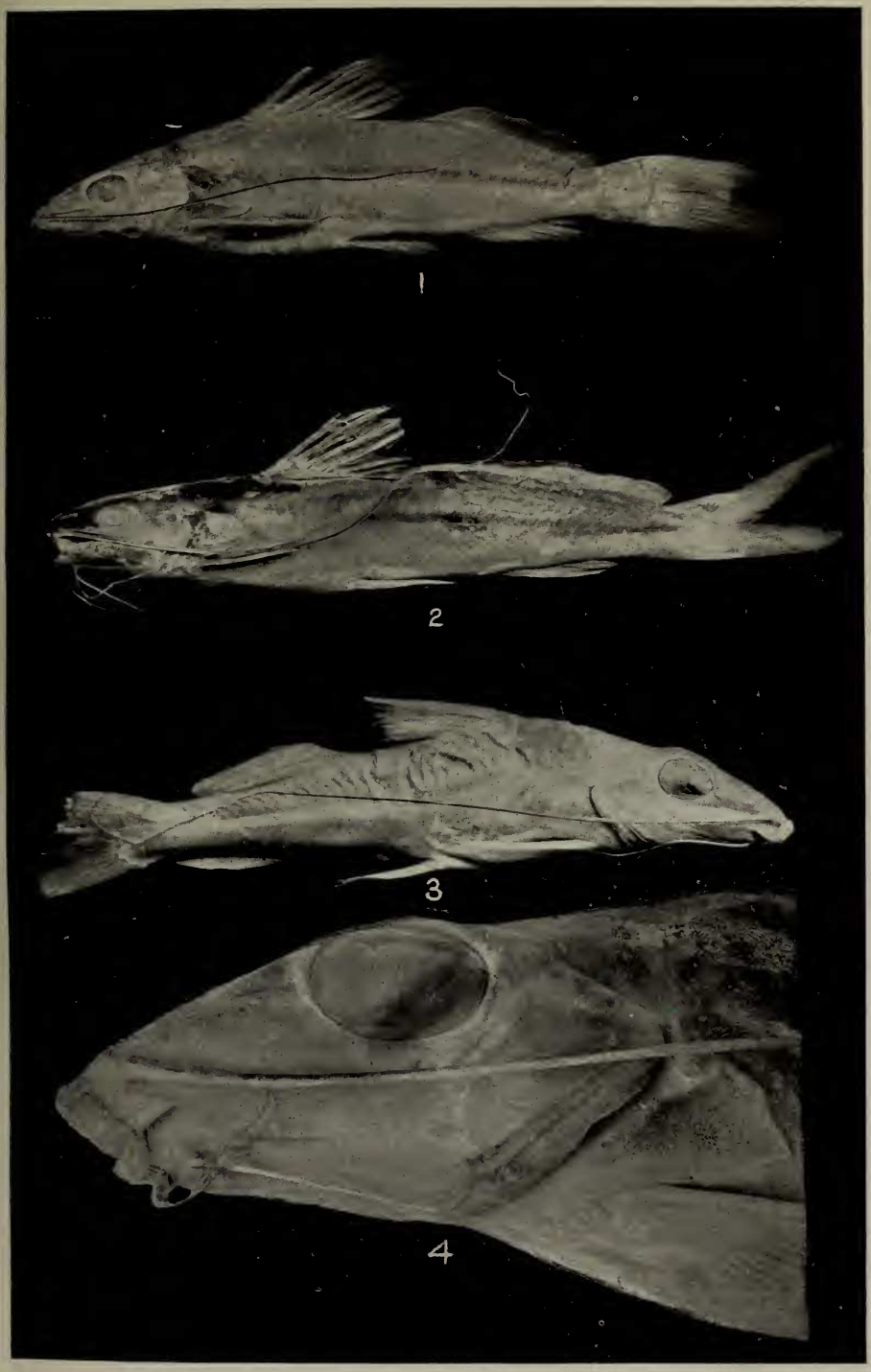


Fig. 1. *Pimelodella mucosa* Eigenmann and Ward. (Type.)
Fig. 2. *Pimelodella gracilis* Valenciennes.
Figs. 3-4. *Iheringichthys megalops* Eigenmann and Ward. (Type.)

the head curved, with about fifteen straight, feeble spines along the middle of the posterior surface, anterior surface with minute denticulations along the basal part, and feeble recurved hooks near its tip. Color light brown, a dark lateral band; fins blotched with black. Head 4; depth 5; D.I,6; A. 10.

8. *Pimelodus ornata* Kner. Cabezudo.

One specimen from Corumba (358).

9. *Pimelodus clarias* (Bloch).

One specimen from Porto Murtinho (286), one from Bahia Negra (398), two specimens from Corumba (291).

10. *Pimelodus fur* Reinhardt.

One specimen from Corumba (part of 290).

11. *Pimelodus valenciennis* (Kröyer).

One specimen, Laguna Ipacarai (451).

12. *Iheringichthys megalops* Eigenmann and Ward sp. nov. (Plate XXXII., Figs. 3–4).

Type No. 10126. One specimen, 175 mm. Bahia Negra, Rio Paraguay (No. 400).

This species resembles *Iheringichthys labrosus*, the only other species of the genus. In every character behind the head the two species appear identical. The differences in the head, comparing specimens of same size, are as follows:

a. Interorbital concave; width of occipital process at its base equal to its length; widest part of fontanel about 2 in interorbital. Eye $3\frac{3}{5}$ in the head; snout $2\frac{1}{6}$ in the head; postorbital part of head $3\frac{3}{5}$; interorbital 5; upper lip scarcely narrowed in the middle. ..... *megalops.*

aa. Interorbital flat; occipital process distinctly narrower than long; widest part of fontanel about 3 in interorbital. Eye $4\frac{1}{4}$ in the head, 2 in the snout; snout $2\frac{1}{8}$; postorbital portion of head $3\frac{5}{12}$; interorbital 4 in the head; upper lip with a deep notch in the middle..... .... *labrosus.*

Body not as wide as deep at shoulders, compressed toward caudal; head sub-conical, slightly depressed, its greatest width $1\frac{1}{3}$ in its length, its greatest depth about 2 in its length. Snout conical; entire upper portion of head granulose or striate; fontanel scarcely reaching to posterior margin of eye; occipital process as wide at base as long; distance between the nostrils slightly greater than half the diameter of the eye. Maxillary barbels extending very little, if any, beyond tip of caudal; postmental barbels extending to middle of pectorals; mentals not reaching pectorals. Eye elongate, very large,

$3\frac{3}{5}$ in the head, $1\frac{1}{2}$ in the snout, $\frac{7}{8}$ in the interorbital region. Preorbitals prominent; interorbitals distinctly concave; mouth very narrow, jaws not equal; lips very thick, upper lip with its free margin reflexed, scarcely, if at all notched; upper lip extending beyond the lower by $\frac{1}{4}$ diameter of the eye; teeth of the jaws in very narrow bands; no teeth on the vomer; teeth on the pterygoids inconspicuous. Dorsal spine strong, $1\frac{1}{4}$ in length of head, serrate on posterior margin; distance of adipose fin from dorsal slightly less than length of adipose, which is $4\frac{1}{4}$ in the length. Caudal forked. Pectoral spine strongly serrate on both margins, serrations on inner margin a little the stronger, the spine a little shorter than the head. Humeral process triangular, pointed behind, but not spine-like, scarcely reaching to middle of pectoral spine, its surface granulose-striate. Ventrals reaching to anal, margin of anal concave, some of the anterior rays extending much beyond tip of last. Anterior upper portion of the body spotted, otherwise plain.

Head $3\frac{1}{4}$; depth $4\frac{1}{4}$; D. I, 6; A. 11.

13. *Iheringichthys labrosus* (Kröyer) (Plate XXXIII., Fig. 1).

One specimen from Corumba (290), and four from Bahia Negra (382).

14. *Hemisorubim platyrhynchos* (Cuvier and Valenciennes) Jiripoca.

One specimen from Corumba (359).

15 *Doras costatus* (Linn.).

One specimen from Corumba (364); another from Laguna Ipacarai (449).

16. *Doras weddelli* Castelnau.

One specimen colored like the type figured by Castelnau. Tributary of Rio Pilcomayo (445).

17. *Oxydoras eigenmanni* Boulenger.

Eight specimens from Corumba (365).

18. *Hemidoras paraguayensis* Eigenmann and Ward sp. nov. (Plate XXXIV, Fig. 1).

Type No. 10127. One specimen, Corumba (366).

This species is closely related to *nattereri*, from which it differs in the characters set forth in the following key:

a. Depth equal to length of head; lower jaw sometimes with patches of teeth. Maxillary barbel extending to below the eye; caudal deeply forked..... *nattereri.*

aa. Body distinctly deeper than length of head; lower jaw without teeth. Maxillary barbel extending to gill-opening. Caudal scarcely forked, the lower lobe wider and longer than the upper..... *paraguayensis* sp. nov.

Fig. 1. *Iheringichthys labrosus* (Kröyer).
Fig. 2. Dentition of *Serrasalmo humeralis* (Cuvier and Valenciennes).

Fig. 1. *Hemidoras paraguayensis* Eigenmann and Ward. (Type.)
Figs. 2–3. *Homodiætus anisitsi* Eigenmann and Ward. (Type.)

Body short and deep; ventral outline almost straight to base of anal; profile steep to nostrils, rounded at base of dorsal spine; head short, slightly deeper than wide, its depth equal to its length. Interorbital region convex. Occipital region steep and convex. Fontanel an oval opening somewhat shorter than the eye, situated in a groove 1½ times as long as the eye. Eye large, 1¼ in the snout, 3 in the head, 1⅓ in the interorbital; snout short, rounded. Barbels all connected by a membrane, those of the maxillary extending to gill-openings, with a few cirri on their outer margins; gill opening extending forward to about ½ the distance of the eye. Coracoid process exposed, striate. Humeral process broad and long and with a strong keel, its surface striate. A few imbedded scutes in front of a large scute which is connected with the dorsal plate; the following lateral scutes much lower, each with a large median hook and a series of fine marginal teeth above and a series of one large and several fine teeth below the median hook. The lateral scutes on the caudal peduncle have a more enlarged median hook, and the fine marginal teeth fewer, or none. No plates on dorsal or ventral surface. Distance of the dorsal spine from the snout 2¼ in the length. Dorsal spine slightly curved, its anterior margin with rather long and fine teeth to near the tip, its posterior margin with short, wide-set teeth. Space between dorsal and adipose fins 3¾ in the length. Adipose fin as high as long. Caudal scarcely emarginate, the lower lobe much wider and somewhat longer than the upper. Anal fin as high as long, rounded. Ventrals not reaching anal by ⅓ their length. Pectoral spine strong, longer than the dorsal spine, reaching to the second third of the dorsal fins; both margins serrate, both surfaces striate. Color light brown; silvery below lateral scutes; anal and pectoral fins peppered with dark.

Head 3½; depth 2⅝; lat.l. 29; D.I,6; A.12; V. 7; P.I, 8.

19. *Auchenipterus nigripinnis* Boulenger. Bagre Sapo.

Two specimens, Corumba and Puerto Max (353).

20. *Trachycorystes striatulus* (Steindachner).

Two specimens. Tributary of Rio Pilcomayo (444).

PYGIDIIDÆ.

Homodiætus Eigenmann and Ward, gen. nov.

Type: *Homodiætus anisitsi* Eigenmann and Ward.

Dorsal behind the ventrals; no teeth on the vomer; gill-membrane

united with the sides above and with the isthmus below, leaving the opening a very small slit in front of the pectorals; a longer and a shorter maxillary barbel on each side; upper jaw and lips with about eight widely separated series of teeth, the teeth narrow, more or less spoon-oar-shaped, those of the inner series slightly larger; teeth of the lip very movable, those of the jaw more firmly attached; lower lip without teeth, three series of the teeth on the lower jaw, those of the innermost series largest and forming a compact series. All the teeth more or less angularly bent backward near the tips. Opercle with about 4 spines; subopercle with 6; anal short, behind the origin of the dorsal; head depressed, the eye directed upward, mouth inferior; caudal emarginate; very large glandular swellings behind the pectoral.

This genus is most closely allied to *Stegophilus* and *Miuroglanis*. It differs from *Stegophilus* in having two maxillary barbels and from *Miuroglanis* in having an emarginate instead of a rounded caudal and in having several series of labial teeth which are apparently wanting in *Miuroglanis*.

The genus *Stegophilus* as defined by Eigenmann and Eigenmann includes both species with a rounded and an emarginate caudal. Were the species large we should not hesitate in placing them in separate genera and a different rule should not apply here.

The genera of the Stegophilinæ may be defined and distinguished as follows:

a. Upper lip with several series of numerous, small, movable teeth; each jaw with several series of minute teeth; mouth inferior.
  b. Gill-membrane broadly united with the isthmus.
    c. Caudal widely forked, the upper lobe produced in a filament; a single maxillary barbel ..... *Pseudostegophilus*.
    cc. Caudal emarginate.
      d. A single maxillary barbel ..... *Henonemus*[4] nov.
      dd. Two maxillary barbels ..... *Homodiætus* nov.
    ccc. Caudal rounded.
      e. A single maxillary barbel ..... *Stegophilus*.[5]
      ee. Two maxillary barbels ..... *Miuroglanis*.

[4] **Henonemus** Eigenmann & Ward *genus nov.*
(ἑν = one, νῆμα = thread; in allusion to the single barbel.)
Type *Stegophilus intermedius* Eigenmann & Eigenmann.
This genus is distinguished from *Homodiætus* by the possession of a single barbel at the maxillary.

[5] The genus *Stegophilus* as here understood contains two species, *insidiosus* and *reinhardti*, which differ very much from each other in the development of caudal fulcra and which may represent two distinct genera.

bb. "Rimæ branchioles confluentes, membrana branchiostega cum isthmo haud connexa; cauda rotunda, barba maxillaris unica, radia caudalia accessoria nulla" ..... *Acanthopoma.*[6]

aa. No labial teeth; teeth in the jaws in a single series.

f. Teeth pointed, in a single series in the pre-maxillaries only; mouth sub-inferior; caudal rounded or but slightly emarginate; a single maxillary barbel ..... *Vandellia.*

ff. Teeth broad, incisor-like in both jaws; caudal forked; two maxillary barbels. *Pareiodon.*

21. *Homodiætus anisitsi* Eigenmann and Ward sp. nov. (Plate XXXIV., Figs. 2–3).

Type No. 10155, one female 43 mm. long; small creek at Villa Rica, Paraguay (466).

Head 6½; depth 5¾; D. 8; A. 8.

Elongate compressed, head much depressed; head nearly as wide as long; snout broad, its horizontal outline rounded; mouth very large, hemicircular in outline, 2⅕ in the head; lower surface of head flat, upper arched, the eyes directed upward, sidewise and forward; eye equals snout, 3½ in head, about equal to the interorbital; no free orbital margin; origin of maxillary barbels below the last quarter of the eye; outer and longer barbel shorter than eye, inner barbels much shorter, minute but distinct; a distinct thin, free, lower lip extending for but a short distance from the angle of the mouth; teeth of upper lip distinctly visible when mouth is closed; pectorals extending some distance beyond the axillary gland, their length 2⅔ in distance from their base to ventrals, equal in length to their distance from the tip of the mouth; origin of dorsal equidistant from tip of caudal and poste-

[6] Lütken in Videnskabelige Meddelelser for 1891, Kjobenhavn, 1892, describes *Acanthopoma* as follows:

Caput depressum parabolicum, cauda subcompressa: maxillæ in tentaculum breve continuæ; os inferum, supra seriebus dentium minutorum plurimis; rimæ branchiales confluentes, membrana branchiostega cum isthmo gulari haud connexa; spinæ operculares et interoperculares plures; pinna dorsalis post pinnas ventrales, inter has et pinnam analem posita.

ACANTHOPOMA ANNECTENS.

Maal:

Totallængde	100	mm.
Hovedets Længde	15	"
Hovedets Brede	15	"
Legemets største Højde	10.5	"
Fra Snudespidsen til Rygfinnen	60	"
Fra Snudespidsen til Gattet	64	"

rior margin of eye; caudal with numerous accessory rays, slightly emarginate, the upper lobe longest, longer than pectoral; anal inserted below the end of the dorsal; ventrals short, reaching the vent; vent equidistant from tip of mouth and tip of caudal.

Straw-color, back with numerous large, conspicuous, stellate, black chromatophores and many more smaller, much less conspicuous, brown ones; sides with a few small stellate, black, chromatophores, gradually giving rise to a regular series along the middle of the tail; a dusky streak along the sides between the myotomes of the body and the thin covering of the abdominal cavity; a small, intense black spot at the base of the middle caudal ray; middle caudal rays dark, becoming intensely black toward tip; oblique bars extending from the end of the second ray below median dark one downward and forward to the tip of the lower caudal fulcra and then as a black line forward along the tips of the fulcra; another one like it in all respects from the tip of the second ray above the median dark one upward and forward to the tip of the caudal fulcra and then forward along their tips as a black line; remaining fins more or less dotted.

Alimentary canal straight, without convolutions or bends, the thin-walled stomach lying lengthwise and giving rise to a short, thin intestine which merges into the much longer and larger, but thin-walled large intestine which appears to be filled with minute grains of sand.

LORICARIIDÆ.

22. *Hemiodontichthys acipenserinus* Eigenmann and Eigenmann. (Plate XXXV., Fig. 1).

One specimen. Corumba (No. 333).

23. *Sturisoma robusta* (Regan) (Plate XXXVI., Figs. 1–3).

One specimen from Corumba (354).

24. *Loricaria typus* (Bleeker) (Plate XXXV., Figs. 2, 3).

Four specimens from Corumba (331), one from Puerto Max (406), and two from Laguna Pasito, Ascuncion (460).

25. *Loricaria apeltogaster* Boulenger.

One specimen, Corumba (348).

This specimen differs from the other specimens described in having the entire surface of the lower lip covered with short cirri.

26. *Loricaria carinata* Castelnau (Plate XXXVII., Figs. 1–2).

One specimen from Puerto Max (405) and two from Corumba (330). Three from a brook at Villa Rica (465).

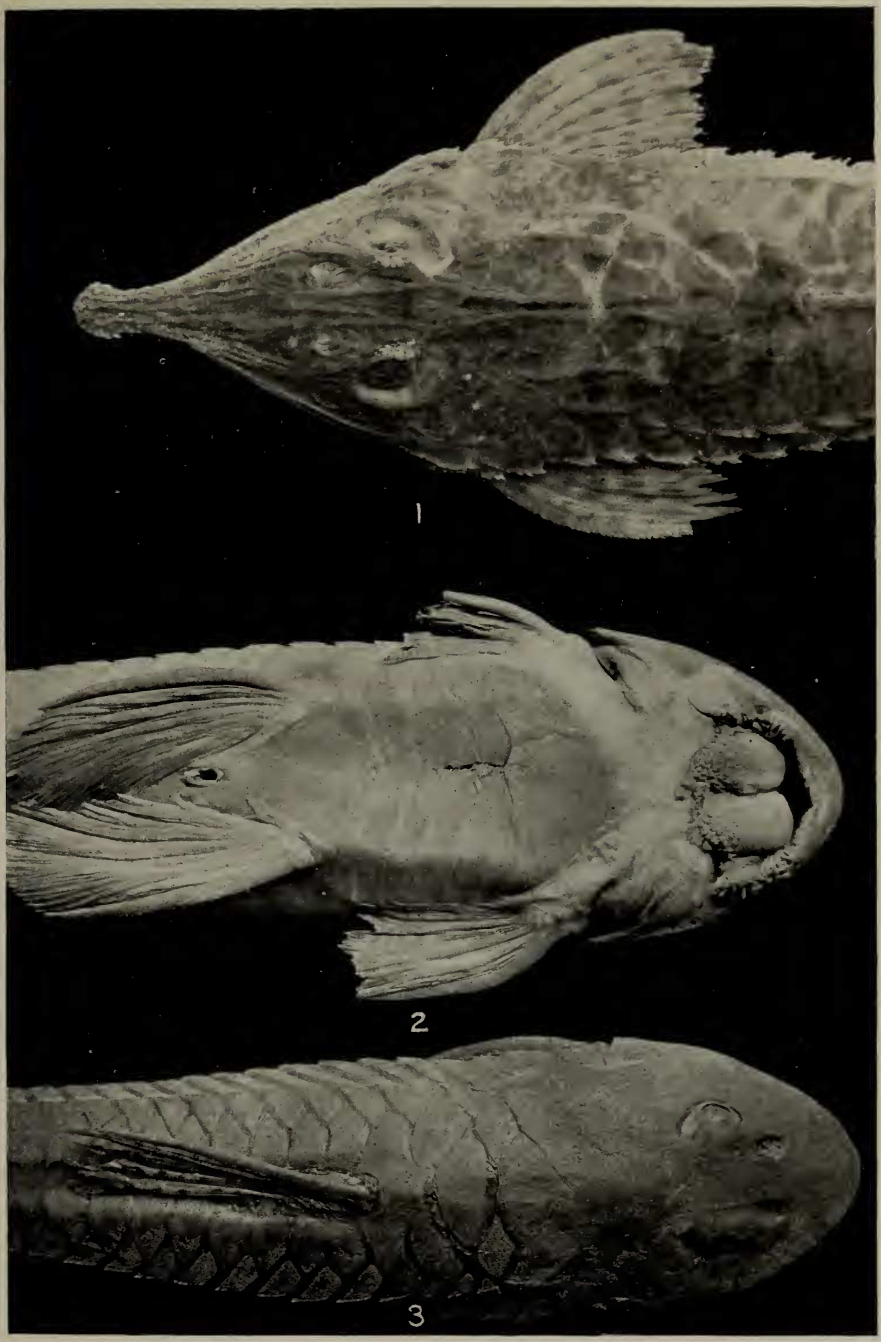


Fig. 1. *Hemiodontichthys acipenserinus* (Kner.).
Figs. 2–3. *Loricaria typus* (Bleeker).

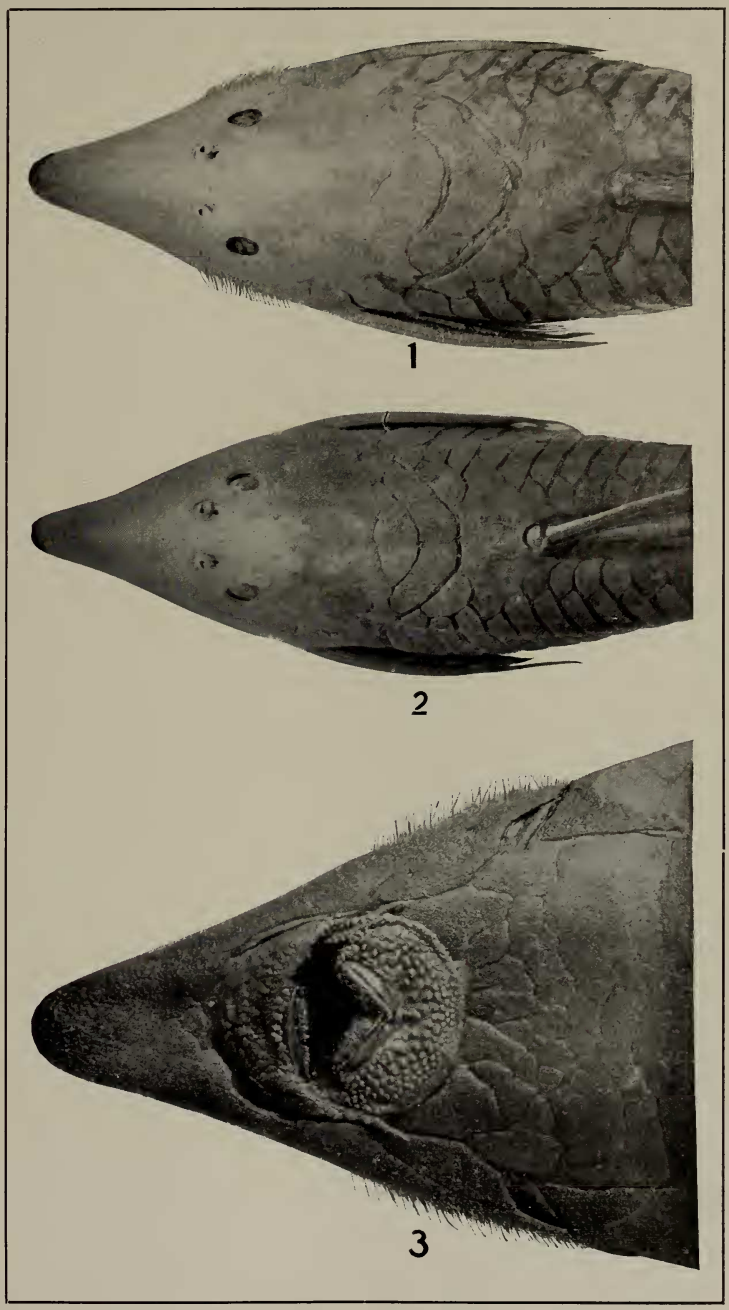


Fig. 1. *Sturisoma robusta* (Regan) ♂, dorsal view.
Fig. 2. *Sturisoma robusta* (Regan) ♀, dorsal view.
Fig. 3. *Sturisoma robusta* (Regan) ♂, ventral view.

Figs. 1–2. *Loricaria carinata* Castelnau.
Figs. 3–4. *Loricaria labialis* Boulenger.

27. *Loricaria parva* Boulenger.

Ten specimens, Corumba (339, 349, 300, 301). Four from Laguna Pasito, at Ascuncion (461).

28. *Loricaria labialis* Boulenger (Plate XXXVII., Figs. 3–4).

Four specimens from Corumba (319).

29. *Otocinclus vittatus* Regan (Plate XXXVIII., Fig. 1).

One specimen (part of 304), Corumba; two specimens (446), tributary of the Pilcomayo.

Description of the Corumba Specimen. — Body rounded in front, compressed toward tail; its greatest width less than depth; profile straight, less steep than in *affinis*. Occipital process terminating in an elevated, triangular process; ventral and dorsal profiles similar; sides of head vertical, eyes distinctly lateral. Interorbital convex; a groove running from snout to nares. All the bones of the head hispid; head nearly covered with spines; spines minute on occipital, strongest on border of snout. Orbit 2 in the snout, 4 in the head, 2 in the interorbital. Snout pointed. Lower surface of the head naked except a triangular space below the eye. Lateral plates hispid. Distance of dorsal fin from tip of snout 2⅛ in the length. Dorsal spine as long as head. Caudal forked. Pectoral extending little beyond origin of ventrals. Ventrals reaching nearly to anal. Color light brown above with a broad dusky bar extending from snout to end of caudal; tips of caudal dark; black bands extending from end of dark band on middle caudal rays first backward, then forward, forming with the median band a ϒ-shaped figure.

Head 3½; D.I, 6; A. 6; V. 6; P.I, 6; C. 16; Lat. l.23.

The two from Pilcomayo are very beautiful, well-preserved specimens, which are slightly longer than the Corumba specimen, being 34 mm. and 25 mm. long. They agree with it in all except the color, which is faded. Traces are visible of the dusky lateral band and markings on the caudal fin. The specimens have the appearance of having been preserved in some corrosive sublimate preparation, or having lived in a cave; one of them has D.I, 7.

KEY TO THE SPECIES OF OTOCINCLUS.

a. Sides with a longitudinal band.

b. Middle caudal rays black. D.I, 6 or 7.

c. Tips of caudal dark; black bands extending from end of the dark band on middle caudal rays first backward and then forward, forming with the median band a ϒ-shaped figure; a well-defined band from tip of snout to caudal, widest at the caudal peduncle, blackest on caudal.

Eye 4 in the head; lat. l.23.....*vittatus.*

cc. Fins, aside from the basal caudal spot, plain; lateral band a weak line on lateral line; lat. l.21 .....*vestitus.*

bb. Middle caudal rays not black; D.I, 7; Lat. l.23–25 .....*affinis.*

aa. Sides spotted; D.I, 7; A.I, 5; lat. l.25.

d. Six spots along lateral line; a series of corresponding spots along the back; dorsal and caudal spotted. Eye 4; lower lip thin and entirely naked. *flexilis.*

dd. Two large spots along the lateral line; a series of corresponding dorsal spots; caudal with 3 vertical dusky bars, sometimes spots. Eye 4.25; lower lip coarsely tubercular.....*fimbriatus.*

30. *Plecostomus plecostomus* (Linnæus).

Three specimens, Corumba (340). These specimens with several sent in the first collection which were not recorded from Ascuncion; Rincomeda on Rio Apa, Arroyo Trementina give us a range of specimens from 60 to 390 mm. in length. There is a great modification in the shape of the head. It becomes lower, broader, and very much more rounded with age. The caudal, which is cross banded in the young, becomes spotted. The dorsal which has a single series of spots between the rays comes to have two series. It is evident from the series that *Plecostomus boulengeri* is but the young of *Plecostomus plecostomus*, as Regan has recently stated.

31. *Plecostomus johni* Steindachner.

I am inclined to think that both *Plecostomus commersoni* and *vermicularis* mentioned in the first paper on Paraguayan fishes and *Plecostomus ternetzi* Boulenger should be placed here. The *vermicularis* is a small specimen and its identification must be more or less of a guess.

Our largest specimen is about 200 mm. long. In this the region in front of the gill slit, a band across the breast and a large triangular patch on the middle of the belly are granular and there is a series of larger plates along the sides of the belly between the pectorals and ventrals. Otherwise the lower surface is naked. In the smaller specimen there is also a median granular band between the ventrals. In the shape of the head, spines of the lateral plates, lateral line, etc., the specimens agree with *Plecostomus ternetzi.* Our larger one differs in having the dorsal with large spots, but these spots are quite obscure. In the smaller specimen the dorsal is uniform dark, as in the type of *ternetzi.*

32. *Xenocara gymnorhynchus* Kner.

One specimen, mountain brook at Sapucay, Central Paraguay (452),

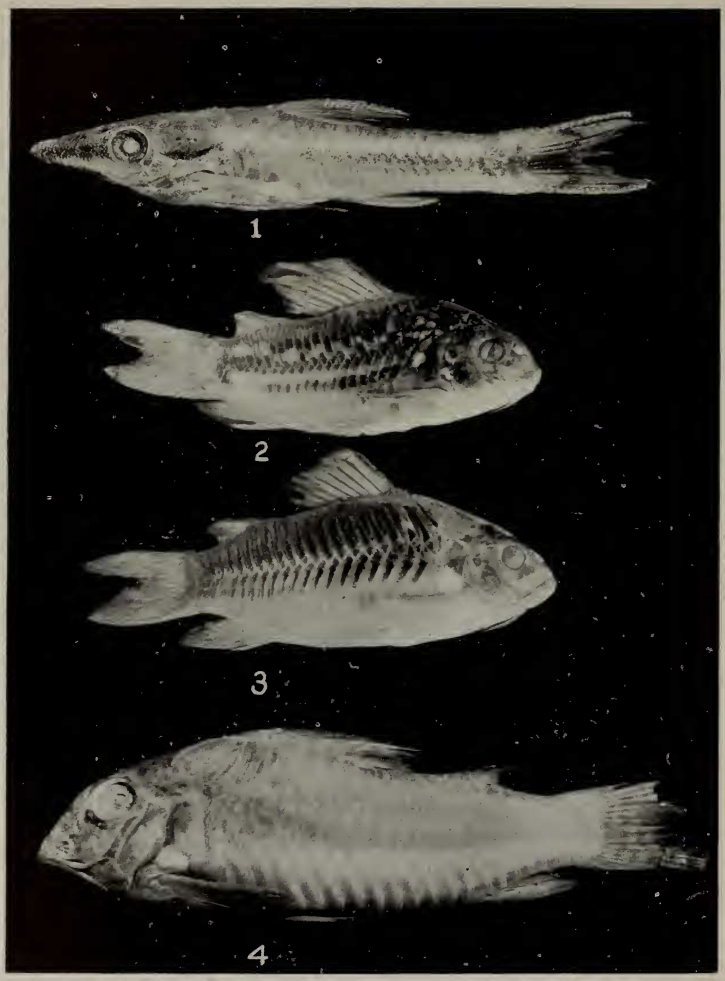


Fig. 1. *Otocinclus vittatus* Regan.
Figs. 2–3. *Corydoras microps* Eigenmann and Kennedy.
Fig. 4. *Corydoras aurofrenatus* Eigenmann and Kennedy.

CALLICHTHYIDÆ.

33. *Callichthys callichthys* Linnæus.

Two specimens from Bahia Negra (412).

34. *Hoplosternum pectoralis* (Boulenger).

Two specimens from a swamp near Ascuncion (297).

Two others, Laguna Pasito, at Ascuncion (463).

35. *Hoplosternum littorale* (Hancock).

One specimen from Bahia Negra (411).

36. *Corydoras microps* Eigenmann and Kennedy (Plate XXXVIII., Figs. 2, 3).

Four specimens, mountain stream, Sapucay, central Paraguay (453), six from small brooks at Colonia Gonzales, Villa Rica (467).

37. *Corydoras aurofrenatus* Eigenmann and Kennedy (Plate XXXVIII., Fig. 4).

Two specimens, small brook at Villa Rica (472).

38. *Corydoras australe* Eigenmann and Ward, sp. nov.

Type No. 10129, one specimen, Corumba (304). Cotypes, 10130, five specimens Corumba (304); two specimens (447), tributary of the Rio Pilcomayo.

This species is very closely related to *hastatus* and may be identical with it. The coloration of the caudal in the two species is identical, but the lateral band in *hastatus* is jet-black, while in this species it is an indistinct line.

Anterior profile strongly rounded and nearly vertical to the nostrils, less steep and almost straight from nares to dorsal. Head slightly longer than deep; width 1⅓ in its length; occipital process slender and triangular, meeting the dorsal plate; fontanel quite elongate, extending into the occipital bone; preorbital small. Eye very large, orbit one in the snout, 3 in the head, 1⅔ in interorbital. Mouth inferior, snout rounded, short; rictal barbels extending to middle of eye; lower lip terminating in two barbels. Coracoid process striate, forming a ridge on the side of belly. Distance of the dorsal spine from the snout 2 in the length, height of dorsal spine a little less than length of head. Caudal deeply forked. Pectoral spine longer than dorsal spine, its surface striate, comparatively free from serrations. Straw color. An indistinct dusky line from gills to base of caudal, terminating in a large arrow-shaped spot which is bordered posteriorly with white, which itself is narrowly margined with blackish, the caudal dusky beyond (as in *hastatus*). A faint line from behind

ventrals to behind anal. Head back of eyes dusky, the color extending down and back on the sides posterior to the gill-openings. Head 3½; depth 2½; D.I, 7; P.I. 7; V. 7; lat. l.22.

CHARACIDÆ.

39. *Hoplias malabaricus* (Bloch.) Trahira.

Three specimens, Corumba (362); one specimen, Bahia Negra (396).

40. *Hoplerythrinus unitæniatus* (Spix).

Two specimens, Bahia Negra (402).

41. *Pyrrhulina australe* Eigenmann and Kennedy.

Five specimens, Upper Paraguay at Corumba (309, 316).

42. *Psectrogaster curviventris* Eigenmann and Kennedy. Blanquillo.

One specimen, Bahia Negra (374), and one specimen Puerto Max (408).

43. *Curimatella alburnus* (Müller and Troschel).

One specimen, Bahia Negra (375).

44. *Curimatus elegans nitens* Holmberg.

Curimatus elegans paraguayensis E. & K.

Two specimens, Ascuncion (276). Two specimens from mountain streams at Sapucay (457).

45. *Curimatus bimaculatus* Steindachner.

One specimen, Corumba (357).

46. *Prochilodus scrofa* Steindachner.

One specimen, Bahia Negra (396).

47. *Anisitsia othonops*[7] (Eigenmann & Kennedy).

One specimen, Bahia Negra (403).

48. *Parodon paraguayensis* Eigenmann (Plate XXXIX., Fig. 1).

Nineteen specimens, Ascuncion (275).

49. *Nanognathus borelli* Boulenger (Plate XXXIX., Fig. 2).

Anostomus fasciatus Eigenmann & Kennedy, Proc. Phila. Acad. Sci. 1903, 512, 1904 (Rio Paraguay at Ascuncion and Estancia la Armonia).

The specimens mentioned by E. & K. and three additional ones from Corumba (338, 357) and one from Puerto Max (409) differ from *fasciatus* in having no caudal spot. They differ from the typical *dissimilis* Garman in having but 40–42 scales in the lateral line and the head 4½ in the length, instead of 4⅔.

[7] Misprinted orthonops in E. & K.'s article, *l. c.*, 511.

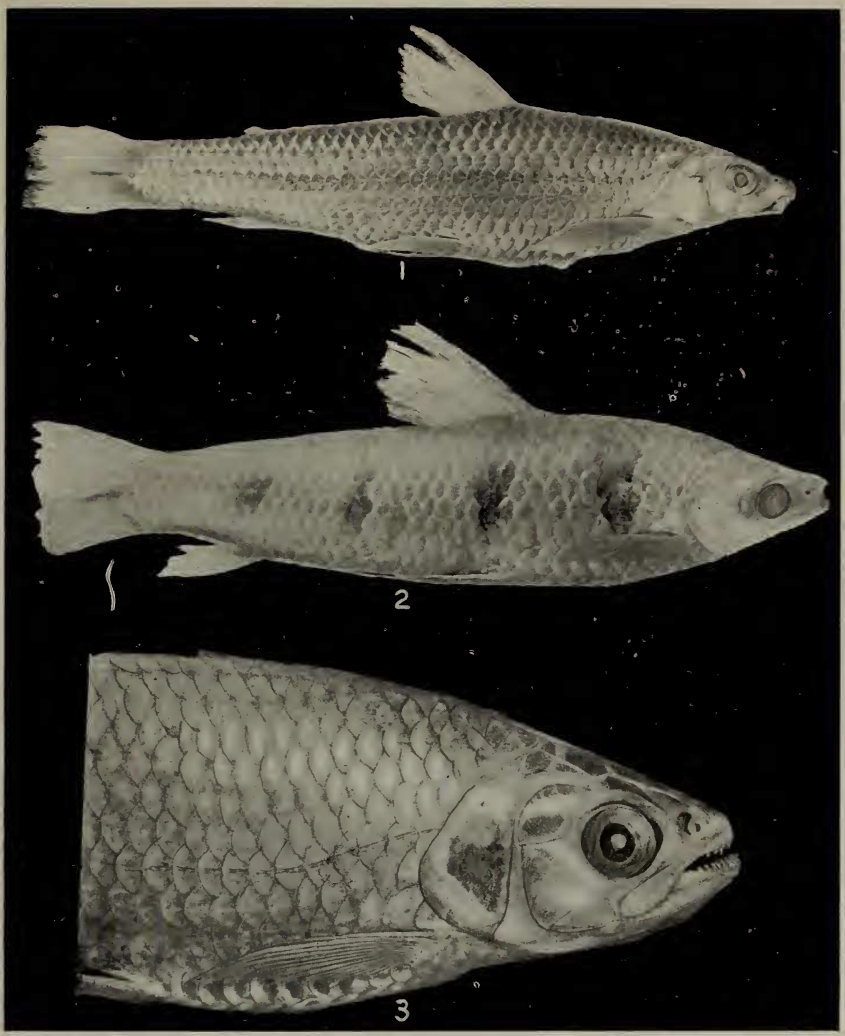


Fig. 1. *Parodon paraguayensis* Eigenmann.
Fig. 2. *Schizodon borelli* Boulenger.
Fig. 3. *Aphiocharax dentatus* Eigenmann and Kennedy.

50. *Leporinus frederici* (Bloch).

Two specimens, Puerto Max (407).

51. *Leporinus trifasciatus* Steindachner.

A single specimen from Bahia Negra, 310 mm. (401), and another one from Ascuncion.

Head 3⅔; depth 4; eye 5½ in the head, 3 in interorbital. Scales 6–42–5.

52. *Leporinus affinis* Günther.

One specimen (195), Arroyo Trementina.

53. *Leporinus hypselonotus* Günther.

Two specimens (413) from Puerto Max, are probably the young of this species. Length 18 mm.

Depth 3; head 3. Body with 8 transverse bands, the last on the caudal peduncle. Some of these near the middle of the body have a tendency to split at the top, Y-shaped. Head with a diamond-shaped, dark blotch on top, enclosing an oblong, lighter portion, and with a line from eye, around lower lip, and a dark opercular blotch.

Form somewhat different from that of the adult, especially as to the head. Lower jaw more prominent, dorsal profile of head not concave but forming part of an even line from dorsal fin to snout.

Teeth strap-shaped, a pair of stronger ones set slightly behind the others in the mandible.

54. *Characidium fasciatum* Reinhardt.

Two specimens, one (471) from Villa Rica and the other (448) from a tributary of the Pilcomayo. The latter specimen is very pale, having a faint lateral band, a black spot at base of middle caudal rays and the lateral bands faint, most distinct on the back. The Villa Rica specimen, on the contrary, is highly colored, the lateral band wide and the vertical bands distinct. The dorsal with horizontal bands and the caudal with cross-bands.

D. 11; A. 8; lat. l. 37. The pectoral in the Pilcomayo specimen is feeble, not reaching the ventrals; that in the Villa Rica specimen is strong and reaches a little beyond origin of ventrals. The Villa Rica specimen has the general habit and coloration of a darter (*Etheostoma*).

55. *Odontostilbe paraguayensis* Eigenmann & Kennedy.

Five specimens, Corumba (329).

56. *Odontostilbe trementina* Eigenmann & Kennedy.

One specimen, Puerto Max (part of 388).

57. *Cheirodon interruptus* (Jenyns).

Puerto Max (part of 388).

Seven specimens (473), Colonia Gonzales.

58. *Aphiocharax dentatus* Eigenmann & Kennedy (Plate XXXIX., Fig. 3).

Nine specimens from Corumba (272, 282, 274, 367) one from Puerto Max (386), and ten from a small tributary of the Rio Negro, a tributary of the Rio Pilcomayo (443).

Back deep yellow, opercle golden.

In the original account of this species three typographical errors occur. For type No. "10030" read 10032, and under cotypes for "10030 and 10031" read 10034 and 10,035.

59. *Hemigrammus luetkeni* Boulenger.

(Part of 388), Puerto Max.

Three specimens from a pond at Colonia Gonzales, at Villa Rica (470).

60. *Hemigrammus kennedyi* Eigenmann.

Two specimens from Corumba (327), and several from Puerto Max (389).

61. *Hemigrammus ulreyi* (Boulenger).

Specimens 34–40 mm. long, Corumba (328).

62. *Tetragonopterus argenteus* Cuvier. Lambari. (Plate XL., Fig. 1.) *Tetragonopterus chalceus* Eigenmann & Kennedy, l. c., 523.

Eight specimens from Porto Murtinho (287).

Five specimens from Bahia Negra (383).

63. *Tetragonopterus alleni*[8] Eigenmann & McAtee sp. nov. (Plate XL., Fig. 2).

Mojarra Lambari. Type No. 10158, a specimen 110 mm., Corumba (363).

Cotype, No. 10159, a specimen 85 mm. Corumba (363); Cotype, No. 10160, a specimen 95 mm., Rio Otuquis (372); Cotypes, No. 10161, two specimens, 60 and 95 mm., Ascuncion (280).

This species agrees very closely with specimens of *Astyanax multiradiatus* from Ascuncion, Rio Paraguay, but differs notably in the greater depth, and the sharp up-turn of the nape making the profile distinctly a *Tetragonopterus* profile. It is very probable that Steindachner's *Tetragonopterus multiradiatus* is a true *Tetragonopterus*, inasmuch as his largest specimens were but two inches long and yet had

[8] For J. A. Allen, of the American Museum of Natural History.

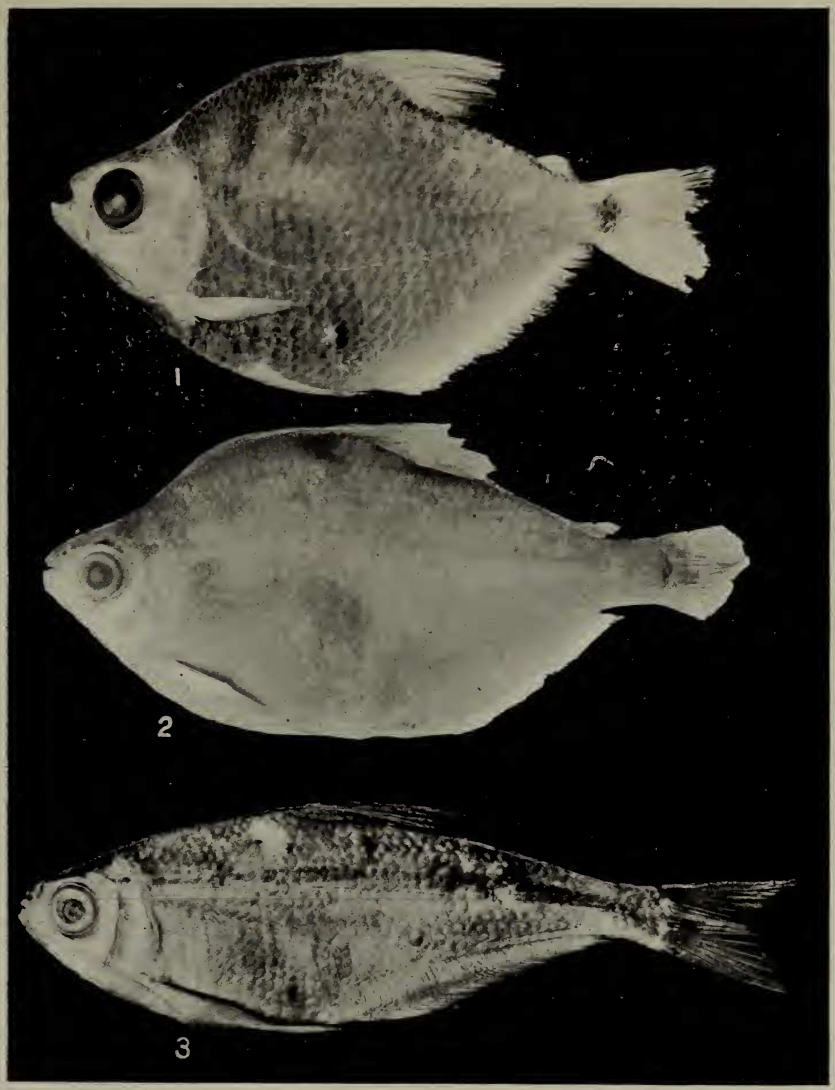


Fig. 1. *Tetragonopterus argenteus* Cuvier.
Fig. 2. *Tetragonopterus alleni* Eigenmann and McAtee.
Fig. 3. *Astyanax pelegrini* Eigenmann.

a depth equal to half the length. It is more than probable that the *Astyanax multiradiatus* of Eigenmann and Kennedy is a species distinct from Steindachner's.

Head 4; depth 2; D. 11; A. 40–41; scales 11–50–8.

Compressed, more elongate than in *argenteus*; anterior profile concave. Snout blunt, interorbital convex. Eye 2¾ in head, not equal to the interorbital, ¼ longer than snout. Maxillary small, not reaching to below eye; no teeth on maxillary.

Origin of dorsal equidistant from tip of snout and base of middle caudal rays or nearer the former, inserted distinctly behind the ventrals, not falcate, the longest ray not nearly reaching adipose; anal not falcate, the rays of nearly the same height its entire length; ventrals about reaching anal; pectoral a little beyond origin of ventrals.

A faint humeral and caudal spot, an indistinct silvery lateral band, fins gray, outer pectoral ray dark.

ASTYANAX Baird and Girard.

ASTYANAX Baird and Girard, Proc. Acad. Nat. Sci., Phila., Vol. VII., p. 27, 1854 (*argentatus*).

Pœciluriehthys Gill, Ann. N. Y. Lyc. Nat. Hist., 1858, p. 54, (*brevoortii* = *bimaculatus*).

The genus *Astyanax* is one of the oldest and most widely distributed genera of South American Characins. It is now one of the dominant South American genera, being found from the Rio Negro on the borders of Patagonia to the United States, and on both slopes from Peru north to Mexico. Its counterpart is found in Africa as *Petersius*. It has hitherto been associated with a number of other genera under the name *Tetragonopterus* with the following characters:

Premaxillaries with two series of multicuspid teeth, none of them enlarged; maxillary with or without teeth; mandible with a single series, those in front very strong, graduated and multicuspid, those of the side abruptly minute and usually conical; gill-rakers setiform; no predorsal spine; maxillary short; the snout and maxillary together less than half the length of the head.

The species with the characters just noted represent several genera which may be divided as follows:

a. Caudal and anal both naked.

b. Lateral line interrupted.

c. Maxillary with usually conical teeth along its entire edge.
Holopristis Eigenmann.

cc. Maxillary with 0–5 conical or multicuspid teeth at its anterior upper end.....*Hemigrammus* Gill.

bb. Lateral line complete.

c. Maxillary with 0–10 teeth.

d. Nape rather abruptly elevated, profile very concave, depth less than half the length, preventral region flat, with lateral keels.
Tetragonopterus Cuvier.

dd. Profile little if at all concave, depth usually less than half the length, preventral region rounded. *Astyanax* Baird and Girard.

cc. Maxillary with teeth along its entire edge.....*Hemibrycon* Günther.

aa. Caudal scaled.

e. Anal scaled, long, rounded, with over 40 rays.....*Markiana* Eigenmann.

ee. Anal naked, with 23–28 rays.

f. Premaxillary teeth parallel.....*Mœnkhausia* Eigenmann.

ff. Anterior series of premaxillary teeth in a wavy line.
Bryconamericus Eigenmann.

KEY TO THE SPECIES OF ASTYANAX BAIRD AND GIRARD.

a. Anal rays 30 to 49.

b. Lateral line 55; anal 45; head 3.6; depth 2.63; lateral line 55. Eye greater than snout by one third of its diameter, greater than interorbital by $\frac{1}{5}$–$\frac{1}{6}$ of its diameter.....*erythropterus* (Holmberg) 1.

bb. Lateral line with 50 scales or fewer.

c. Anal 40–48.

d. Scales 42–50.

e. Anal 47–48; scales small, 47 in lateral line.

f. A few rudimentary teeth on the maxillary; a silvery lateral band; ventral profile much arched; snout pointed; A. 48.....*spilurus* (Cuvier & Valenciennes) 2.

ff. No teeth on the maxillary; a very distinct silvery lateral band; an indistinct caudal and humeral spot; maxillary reaching anterior margin of orbit; depth 2.3; eye 3 in. the head; scales 9 or 10–47–10 or 11; A.47.
hauxwellianus (Cope) 3

ee. Anal 41–45.

g. Scales 8–46–8; two teeth on maxillary; lateral band not conspicuous; humeral spot bordered with silvery in front and behind; caudal spot large, continued to end of middle caudal rays; depth 3; eye 2½; A. 41.
riveti Pelegrin 4.

gg. Scales 10–45 to 50–8 or 9; a small silvery lateral band; a dark spot on shoulder and one on base of caudal [9]

[9] These spots are very obscure in alcoholic specimens, while in specimens first preserved in formalin they are conspicuous and a black band replaces the silvery band of the alcoholic specimens.

depth 2⅛–2⅔; A. 41–45; maxillary with a single, rather large caducous tooth; eye 2.4 in the head, about equal to interorbital; head 4.1–4.5.

pelegrini Eigenmann 5.

ggg. Scales 8–42–7 or 8; A. 42; eye 3.7 in the head, 1.7 in the interorbital; head 3.7 in the length; a caudal spot..... .....*correntinus* (Holmberg) 6.

dd. Scales 37–38.

h. Several small teeth on the maxillary; head 3⅗; depth 3 or somewhat more than 3; snout 4 in the head; a silvery lateral band bordered above by blue-green; a round humeral spot; caudal spot, when present, extends to the end of some of the caudal rays. A. 43; scales 6–37 or 38–4.

bairdii (Steindachner) 7.

hh. Maxillary with a single small tooth. Scales in lateral line 37 or 38; caudal and humeral spots round, both very distinct; middle of caudal fin thickly dotted with black; maxillary not reaching orbit; head nearly 4; depth about 2¾; A. 40–42..... .....*tabatingæ* (Steindachner) 8.

cc. Anal 30–41.

j. A silvery lateral band ending in a black caudal spot, sometimes two lateral spots in front; maxillary very short, 2 in the eye; depth 2½–3; head 4–4⅓; eye 2½–2⅔ in head; D. 11, posterior to ventrals; A. 35–40. Lat. line 44–47.

festæ (Boulenger) 9.

jj. A black band extends from base of caudal fin along its middle rays; maxillary extending to eye; eye 2⅝–3 in head; depth 2⅔–2¾; head 4; A. 34–40; scales 8 or 9–40 to 50–8 or 9; last dorsal over first anal ray.....*brevirostris* (Günther) 10.

ii. Scales in the lateral line less than 40 (except in *abramis*, sometimes in *brevoorti* and *bimaculatus*).

k. Anal rays 36 or fewer, rarely as many as 39 in *bimaculatus*; maxillary with a few teeth or none.

l. Depth more than three in the length, the form long and slender; maxillary without teeth.

m. No caudal or humeral spots; a silvery lateral band, most distinct posteriorly; head 3½; eye 2½ in the head. A. 30; scales 5–35–3..*astictus* (Ulrey) 11.

ll. Depth less than 3 in the length; a distinct caudal spot.

n. No humeral spot; depth 2½–2⅗; eye 3⅔–4 in the head; maxillary with 0–3 teeth, extending considerably beyond anterior margin of eye; a conspicuous black band on the caudal peduncle, becoming wedge-shaped on the caudal. A. 29–31. Scales 7 or 8–37 or 38–6.....*maximus* (Steindachner) 12.

nn. A distinct humeral spot. (See *abramis*.)

o. Maxillary long, extending to below center of eye;

eye 3 in the head; maxillary without teeth; a black humeral spot, a silvery lateral band, becoming black on the tail and extending up on the caudal. A.30; scales 8–37 or 38–7; depth 2¾.....*moorii* (Boulenger) 13.

oo. Maxillary extending little, if any, beyond origin of eye.

p. Dorsal plain.

q. Body deep; humeral spot usually horizontally elongate.

r. Scales in 19 or 20 rows, 10–43 to 47–8 or 9. Anal 28–32. Caudal plain or with an indistinct spot; humeral spot indistinct or wanting. Dorsal distinctly behind the ventral, the pectoral reaching the ventral. Depth 2½; head less than 4; scales in 18 or 19 rows, 10–43 to 47–8 or 9. *abramis* (Jenyns) 14.

rr. Scales in fewer than 17 rows.

s. Moderately compressed.

t. Teeth of the inner series of the premaxillary with their posterior surface convex, the denticles corresponding to the convexity, arranged in a U-shaped line.

v. Scales 6 to 8–30 to 40–5 to 8; maxillary with 0–4 teeth, extending somewhat beyond the front margin of the eye. Depth 2–2.1; head 4–4⅕; eye 3 in the head. A. 27–39. *bimaculatus* (Linnæus) 15.

tt. Teeth of the inner series of the premaxillary alike in front and behind, the denticles arranged in a nearly straight line; scales 6–

40–6; maxillary with a single tooth, extending to below origin of pupil; depth 2.4; head 4; eye a little more than 3 in head. A. 33.
orthodus
Eigenmann 16.

ss. Greatly compressed. Scales 7 or 8–39 or 40–6 or 7; a humeral and a caudal spot; the pectorals extend beyond origin of ventrals; maxillary toothless, extending somewhat beyond front margin of orbit; head $3\frac{1}{4}$–$3\frac{2}{5}$; depth $2\frac{1}{3}$–$2\frac{1}{4}$; A. 38–41.
caucanus
(Steindachner) 17.

qq. Humeral spot circular or vertically elongate.

u. Depth 2–2.2; scales 8 or 9–36 to 40–8 or 9; a humeral and a caudal spot; maxillary with one tooth; head 3.66; A. 38–39; dorsal and ventral outlines equally curved.
atratoensis Eigenmann 18.

uu. Body more elongate; humeral spot circular. Anal rays 38. A silvery lateral band. Dorsal a little behind the origin of the ventrals, the anterior anal rays elongate. Maxillary extending to near the anterior margin of the eye. Depth 2.4; head 3.5; scales 8–39–10.
stilbe (Cope) 19.

pp. Dorsal plain or with a broad, oblique, dark band across the middle. Scales 8–39–7; maxillary extends a little beyond the origin of the eye; D. 11; A. 31; depth $2\frac{3}{4}$; head $3\frac{2}{3}$...*bartlettii* (Günther) 20.

aa. Anal rays 26–29. (Sometimes as many as 36 in *cordovæ*.)

v. A series of seven, deep brown, longitudinal bands. Maxillary extending little, if any, beyond anterior margin of eye, with one tooth. Head $3\frac{3}{5}$;

depth a little more than 2 in the length. A. 27; scales 5–31–4. (See also under *bimaculatus.*).....*steindachneri* (Eigenmann) 21.

vv. A single lateral band or none.

w. Caudal without vertical band.

x. Scales 28–35.

y. A caudal spot.

z. Humeral spot horizontally oval.

A. Lateral band black. (See also *bimaculatus.*) Scales in 14 rows. Dorsal fin behind the base of the ventrals. Maxillary with one tooth extending a little beyond the anterior border of the eye; interorbital space much greater than the eye. Head 3⅔; depth 3; A. 28; scales 7–34–6.

wappi (Cuvier & Valenciennes) 22.

zz. Shoulder spot if present vertically elongate, sometimes faint.

B. Caudal spot band-like, continued on the middle caudal rays; scales in less than 15 rows.

C. A humeral spot.

D. Dorsal behind the ventrals.

E. Maxillary with 2–7 teeth; anal 27–32; depth 2½–3; head about 4; maxillary equal to eye; eye 3 in head, equal to interorbital. Scales 7–37–6.

rutilus nicaraguensis Eigenmann 23.

EE. Maxillary with 0–2 teeth.

F. Head 4, or more than 4, in the length. A band-like caudal spot sometimes extending forward to the indistinct humeral spot. Maxillary extending distinctly beyond the anterior margin of the eye. Head 4–4½; depth 2.25–3; A. 25–30; scales 6 or 7–30 to 39–4½ to 6.

rutilus[10] (Jenyns) 24.

FF. Caudal bordered above and below by yellow; a silvery lateral band; a humeral spot; head not 4 in the length. A. 27–35. Scales 7–38–7. Maxillary with a single tooth.

tæniurus (Gill) 25.

FFF. A. 24–32; origin of the dorsal behind the base of the ventrals; maxillary reaching an-

[10] *Rutilus jequitinhonhæ* has depth 3.

terior border of the orbit; head 4; depth 2.25–2.75; scales 7 to 9–35 to 39–6 or 7. *rutilus æneus* (Günther) 26.

FFFF. Depth 3.33; head 3.66; A. 29; scales 7–37–5; maxillary long, equal to eye; eye 2.5 in head; interorbital 3.66...*cuvieri* (Lütken) 27.

DD. Dorsal over ventrals; snout less than 4 in the head; interorbital flattish. A. 27, beginning behind the dorsal. Depth 3; head 4; lateral line 37. *petenensis* (Günther) 28.

CC. No humeral spot.

G. Dorsal behind ventrals; snout about 4 in the head; interorbital convex. A. 26–30, beginning under last ray of dorsal; depth 3–3½; head 3⅔–4. Lateral line 36–40; no maxillary teeth; a silvery lateral band which may become black on caudal. *simus* (Boulenger) 29.

GG. Head 3½–4⅓; depth 2¾–3; interorbital much more than diameter of the eye. Maxillary terminates below the anterior margin of the eye; origin of dorsal behind the ventrals. A. 26–30; scales 6–35 to 37–6 to 8. *peruanus*[11] (Müller & Troschel) 30.

BB. Caudal spot not continued on the middle rays.

H. Scales in 15 rows, 7–36–7. Humeral and caudal spots present, anal and ventral with broad red margins; eye 3⅔ in the head, much smaller than the convex interorbital. Maxillary extending to anterior margin of eye. A. 27–31..... *humilis* (Günther) 31.

HH. Scales in 10–14 rows; lateral line 34–38.

I. Head 4, or less than 4, in the length.

J. A humeral spot. Maxillary reaching anterior border of eye, not to end of first suborbital. Head 3¾–4; depth 2.4–2.7; A. 23–28; scales 6½ or 7½–34 to 37–5½ to 6½. Two or three maxillary teeth. *fischeri* (Steindachner) 32.

JJ. Maxillary ceases in front of the verti-

[11] See also *æneus*.

cal from the pupil and end of first suborbital. Dorsal considerably behind origin of ventrals; pectorals reaching beyond ventrals. Eye about equal to the slightly convex interorbital, 3 in the length of the head. Depth 2¾; head 3⅔; A. 26; scales 6½–37 or 38–5; a humeral spot.....*carolinæ* (Gill) 33.

II. Head 4 or more in the length; scales 5½–35–4. Anal, dorsal and caudal fins with red markings; scales in 9½ rows. Caudal and humeral spots indistinct. Head 4.2; depth 3.3; A. 26–27; scales 5½–35–4.....*phœnicopterus* (Cope) 34.

yy. No caudal spot; a humeral spot.

K. Maxillary with 3 small teeth; eye 2.3 in the head; snout 4.5, the flattish interorbital 3; depth 2.66; head 3.6. A. 28; scales 5–35–4; a silvery lateral band, a vertical humeral spot.....*megalops* Eigenmann 35.

KK. Maxillary, with numerous minute teeth, extending beyond the front of the orbit. Snout shorter than eye; eye 2.8–3. A. 29–30; scales 5 or 6–32 or 33–4 to 5. Head $3\frac{3}{5}$; depth 2¼–2½; humeral spot elongate horizontally.....*bahiensis* (Steindachner) 36.

KKK. Maxillary without teeth. Silvery band not edged with green above; origin of dorsal between ventral and anal; pectorals to origin of ventrals, ventrals nearly to anal. Head 4¾; depth 3½; eye $2\frac{3}{11}$ in head; D. 10; A. 27; scales 5–37–3. *alburnus* (Hensel) 37.

xx. Scales 9–40 to 46–10. Longitudinal series of scales 20. Caudal and humeral spots generally absent; origin of dorsal over root of ventrals. Width of interorbital greater than the diameter of the eye. Head 4; depth 3; A. 26–31. Interorbital very convex, 2⅔ in head; eye equals snout, 3⅔ in head; depth of caudal peduncle about ⅓ of the depth...*cordovæ* (Günther) 38.

xxx. Scales in 15 or 16 rows, 8–39 to 45–7; A. 28 or 29; head 3.6 or 3.5; depth 2.7–3; eye large, 2.6–2.8; interorbital 3.25 in head; maxillary as long as eye, with two narrow teeth; dorsal behind origin of ventrals; humeral spot faint, caudal spot distinct, not continued on middle rays. *emperador* Eigenmann & Ogle 39.

aaa. Anal rays 16–25, rarely 26 or 27 in *fasciatus* and *æneus;* 3 to 5 series of scales below the lateral line in all but *æneus* (6 or 7) and *fasciatus* (4½ to 7½).

L. Maxillary without teeth; two or three scales below the lateral line.

M. No caudal spot.

N. Depth 4.7. Longitudinal series of scales 12. A broad silvery lateral stripe; no caudal spot. Maxillary toothless, rather wide, extends little beyond anterior border of the orbit. Head 4.2; depth 4.7; A. 25..... .....*longior* (Cope) 40.

NN. Depth 2.5–3.5 in the length.

O. A silvery lateral band sharply edged above with a dark band. Dorsal fin a little behind the ventrals. The pectorals not entirely reaching the ventrals, the ventrals reaching the anal. Head $3\frac{1}{5}$; depth 3–$3\frac{3}{4}$; scales 5–32–3. A. 21–22.
copei (Steindachner) 41.

OO. The broad silvery lateral band not edged above with dark. Maxillary extending nearly to the front margin of the eye; anterior dorsal and anal rays elongate. Head $4\frac{2}{5}$; depth $3\frac{1}{7}$; scales 4–35–3; A. 19 .....*diaphanus* (Cope) 42.

OOO. The narrow silvery band edged with greenish above; humeral spots distinct. Origin of the dorsal just behind the ventral; the pectoral reaches to the middle of the base of the ventral. Head $3\frac{2}{5}$–$3\frac{3}{4}$; depth $2\frac{4}{5}$–$2\frac{6}{7}$; A. 24–25; scales 5–32 or 33–3...*colletti* (Steindachner) 43.

MM. Caudal and humeral spots present. Anal 24; scales 5–28–3. Head 4; depth $2\frac{1}{2}$. Origin of the dorsal fin behind the ventral. Maxillary extending to the front margin of the eye.
oligolepis (Günther) 44.

LL. Maxillary with teeth.

P. Middle caudal rays black.

Q. One to three teeth in the maxillary.

R. A. 18–25. Lateral line with 37–40 scales; a silvery-gray lateral band; a dark caudal spot fading out forward. Usually a humeral spot. Maxillary with two small teeth. Head 4; depth $2\frac{3}{4}$–3; scales 7 or 8–37 to 40–3; eye 3 in head.....*mexicanus* Filippi 45.

RR. A. 24–27. Origin of the dorsal behind the base of the ventrals; maxillary toothless, reaching anterior border of the orbit. Head 4; depth $2\frac{1}{4}$–$2\frac{3}{4}$; A. 24–27; scales 7–9–35 to 39–6 or 7 .....*æneus* (Günther) 26.

RRR. A. 18–25, rarely as many as 27. A dark caudal spot extending to the end of some of the rays and fading out anteriorly; a silvery lateral band; an indistinct humeral spot; ventral and pectoral fins with red. Head 4, longer than its depth at the occiput; depth $2\frac{1}{2}$–3; scales 5 or 6–33 to 40–$4\frac{1}{2}$ to 7.....*fasciatus* (Cuvier) 46.

RRRR. A. 19–21; three or four scales below the lateral line; head 4–$4\frac{1}{3}$; depth $2\frac{1}{2}$–3; scales 5–35 to 37–3 or 4; eye 3 in head.....*fasciatus iheringi* (Boulenger) 47.

QQ. Numerous minute teeth on the maxillary, which extends either a little or distinctly behind the front margin of the orbit. Eye small, 3.5–4 in the head. A vertically elongate humeral spot

and a longitudinal caudal stripe extending to the end of the rays and fading out anteriorly. Head 3¼–3¾; depth 3–3⅓; scales 5–33–4. A. 16–18.....*jenynsi* (Steindachner) 48.

PP. Middle caudal rays not black.

S. Scales in lateral line 34–38.

T. A. 19 or 20.[12] Almost colorless; caudal rays sometimes dusky, a grayish lateral band. Pectorals reaching ⅔ to ventrals, ventrals ⅔ to anal. Maxillary, with 2 teeth, reaching to eye. Head 4, depth 3⅕–3¾; scales 4 or 5–35 to 38–4. *mœnkhausi* (Eigenmann & Kennedy) 49.

TT. Anal 17–18. Yellowish above, white on the sides; lateral band plumbeous above, silvery below; a plumbeous humeral spot. Head 4¼ to 4⅓; eye 2½ in head; depth 3⅕–3⅗. Lateral line 34–36. Dorsal band, large part of anal, the body near it and the median spot of the caudal more or less red.....*rubropictus* (Berg) 50.

TTT. Anal 18; scales 37 or 38; depth 3⅕; head 4⅕; plumbeous, fins dusky; pectorals reaching ventrals; ventrals nearly to anal; caudal lobes rounded; snout blunt, lower jaw distinctly shorter than upper; a faint humeral spot. mouth very small, maxillary not reaching eye; eye 3½ in head; interorbital very convex, less than 3 in head; depth of caudal peduncle little less than half the greatest depth..... *eigenmanni* Evermann & Kendall 51.

SS. Scales 5–31–3. Silvery lateral band; a diffuse caudal spot; no humeral spot. Head 3½; depth 2¾. A. 19. *paucidens* (Ulrey) 52.

64. *Astyanax pelegrini* Eigenmann (Plate XL, Fig. 3).

Pœcilurichthys multiradiatus Eigenmann, Proc. Phila. Acad. Sci., 1903, 521. (Not *Tetragonopterus multiradiatus* Steindachner.)

Steindachner describes his *multiradiatus* as having depth 2; head 3.6; eye 3 in head = interorbital; A. 40–41; scales 10–41 to 42–9.

Inasmuch as Steindachner's specimens were 2 inches long and their depth cannot be ascribed to old age, they should very probably be classed with typical *Tetragonopterus*.

Several specimens from the basin of the Paraguay, mentioned in the paper quoted above, and an additional one (380) from Bahia Negra, have the following formula: Depth 2–2.5; head 4–4.5; A. 41–45; scales 9 to 11–45 to 52–7 to 8.

These represent a species certainly distinct from the *multiradiatus* of Steindachner. It may be identical with Cope's *hauxewellianus* from Peru, from which it differs in the number of anal rays, there being 47 in *hauxewellianus*.

[12] 26 in one specimen.

65. *Astyanax bimaculatus lineatus* Perugia.

Many specimens, Ascuncion (281); Corumba (344, 368); Bahia Negra (380); Puerto Max (388, 389, 393) Sapucay (456).

Steindachner states that *bimaculatus* (*maculatus*) varies in the shape of the body, with age and sex, and with the habitat in rapid clear waters or in stagnant water.

Variation in depth, anal rays and scales of *bimaculatus* recorded by:

	Length	Depth	A.	Scales
1. Günther			31–34	7–39–7·5.
2. Steindachner,				
Southeastern Brazil	2½–3 inches	2.4–2.5	32–33	7·5 or 8.5–35 or 36–6 to 7·5.
	♀ 4½–5 "	2.25–2		
	♂ 4½ "	2.33–2.4		
3. Steindachner,				
Cauca & Magdalena		2.1–2.5	32–39	7·5 or 8–35 to 36–7.
4. Lütken (*lacustris*)		2	24–32	5 to 7–34 to 36–4½.
Rio Grande do Sul			27	7–39–5.

Sixty-five specimens from the basin of the Paraguay have the following rays, counting the rudimentary ones:

Two have 27, one has 28, four have 29, thirty-two have 30, eighteen have 31, five have 32 and three have 33.

The specimens from the Paraguay system have usually a small accumulation of pigment cells at the tips of the scales which form horizontal series. It is probable that such a specimen has served Perugia for his type of *lineatus*. Perugia's specimen had 28 anal rays with nothing said as to whether or not the rudimentary rays were counted. It is seen above that some specimens have 28, not counting the rudimentary rays, so that his specimens fall within the limits of *bimaculatus* whether he counted these rays or not. The most important difference is in the number of scales in the lateral line, which, according to Perugia, is 34, whereas the specimens examined by us from the basin of the Paraguay have the scales 36–40 in the following ratio: twelve have 36, twenty have 37, seventeen have 38, eight have 39 and one has 40.

There are no other differences and I have little doubt that Perugia's *lineatus* is identical with *bimaculatus*. If it is desirable to distinguish the differences which the Paraguayan specimens show they may be termed *Astyanax bimaculatus lineatus*.

66. *Astyanax fasciatus* (Cuvier).

P. scabripinnis Eigenmann & Kennedy, l. c., 521.

(With 281), Rio Paraguay, at Ascuncion; four specimens from Villa Rica (part 470).

67. *Astyanax iheringi* (Boulenger).

Seventeen specimens (455, 456), from mountain streams of Sapucay.

68. *Mœnkhausia dichrourus* (Kner). (Plate XLI., Fig. 1).

A single beautiful specimen 57 mm. long (299) from the Rio Paraguay at Tuyuyu, Matto Grosso, probably belongs to this species. The proportion and measurements differ somewhat, and are as follows: D. 9; A. 26; depth 3.5 (the type has depth 2½); head 4.5; scales 5–35–3. Maxillary without teeth, much curved. Middle caudal rays and the tips of all the rays dusky or black, the tips of the lobes beyond the scales black. A well-defined lateral band extending from caudal to below front of dorsal where it is rapidly contracted and tends to disappear before reaching the faint humeral spot.

A low adipose ridge extending from the adipose fin half way to the dorsal. We have other specimens from Corumba and Asuncion.

69. *Mœnkhausia agassizi* (Steindachner) (Plate XLI, Fig. 2).

Two small specimens Nos. 10164, 40 mm. and 10165, 33 mm. from Corumba (305) agree very closely with this species but differ in having the lateral line incomplete. If this is a constant character and not the condition of the age of the specimens, these specimens must be held as species distinct from *agassizi*. Until further specimens are available this question may be left in abeyance.

The great similarity of the specimens with a complete lateral line and an incomplete one is in itself not proof that the two sets of specimens belong to the same species. There are remarkable cases of parallelism between other species concerning whose generic difference there cannot be the slightest doubt.

Head 3.5; depth 2.5; D. 10; A. 23; scales 5–24–3½; pores on 7 or 8 scales.

Maxillary without teeth; eye 2.5 in the head; snout 4½; body deep, robust but moderately compressed; dorsal and ventral outlines equal; caudal peduncle short and deep.

Dorsal behind ventrals, the highest ray about equal to the length of the head; caudal lobes about 1½ times as long as the middle rays; highest anal ray about twice the height of the lowest, the fin not distinctly falcate; ventrals reaching the anal; pectorals reaching beyond origin of ventrals.

Top of head and tip of lower jaw minutely but densely punctate; large

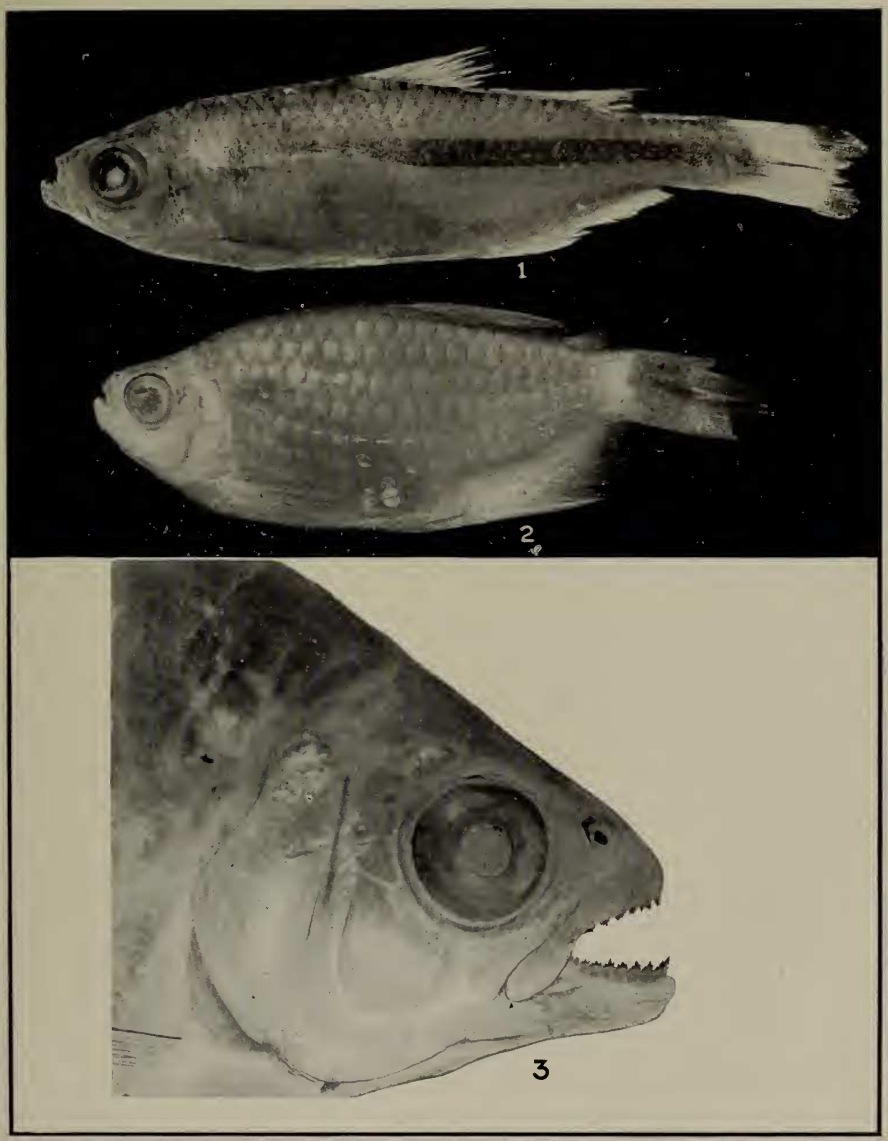


Fig. 1. *Mœnkhausia dichrourus* (Kner).
Fig. 2. *Mœnkhausia agassizi* Steindachner.
Fig. 3. *Deuterodon iguape* Eigenmann. (Type.)

color cells on upper part of cheek and opercle ; back and sides above the lateral streak densely punctate, the margins of the cells blackish ; a row of cells along the margin of the scales below the lateral streak ; belly and breast colorless ; region above anal peppered ; a vertical shoulder spot and a dark lateral streak ; back of caudal peduncle punctate, the peduncle otherwise without pigment except a narrow posterior margin, which, together with the basal part of the caudal is jet black, the band being about as wide as the eye and slightly oblique ; caudal immediately behind the band without pigment ; tip of caudal and all the other fins punctate.

70. *Bryconamericus exodon* Eigenmann gen. et sp. nov.

Pœcilurichthys dichrourus Eigenmann & Kennedy, in part, Proc. Acad. Nat. Sci. Phila., 1903, 522 (Ascuncion).

Type : No. 10298*a*, Indiana University Museum, a specimen 45 mm. long, over all. Puerto Max, J. D. Anisits.

Cotypes : 10298, Indiana University Museum, 5 specimens. Puerto Max.

Cotypes : 10297, Indiana University Museum, 3 specimens, Ascuncion.

Cotypes : 11264, Indiana University Museum, 2 specimens, Ascuncion.

The specimens differ from all other astyanaciform species I have been able to examine in the position of the anterior teeth of the premaxillary. I have both males and females and there are no apparent secondary sexual differences.

Head 4.4–4.33 ; depth 3.66–4 ; D. 9 or 10 ; A. 23–25 ; scales 5–39 or 40–4. Slender, tapering regularly from near the middle of the pectorals to the caudal ; head blunt, mouth moderate, terminal ; maxillary extending beyond origin of eye ; snout and maxillary not quite 2.5 in head ; maxillary not slipping under preorbital ; cheeks covered by suborbitals ; interorbitals slightly convex, very little greater than eye ; eye not quite 3 in head.

Maxillary with two, three, or more pointed teeth ; premaxillary with four, five, or more pointed teeth of the usual sort in the inner series ; outer series consisting sometimes of five teeth in each premaxillary, the second and fourth teeth withdrawn from the line of the first and fifth and alternating with the space between the first and second and third teeth of the inner series ; the anterior series thus form two imperfect series. The first, third, and fifth teeth directed forward

slightly; sometimes there are but four or three teeth, in which case the first and last are directed forward and the other one or ones are withdrawn from the line connecting them. Dentary with four large, many-pointed teeth and several small, mostly conical ones on the side. Dorsal considerably behind the ventrals; adipose well developed; anal margin oblique, but little concave; ventrals small, not reaching anal; pectorals not ventrals. A small humeral spot; a well-defined silvery lateral band from in front of dorsal to caudal; middle caudal rays, margin and tips of caudal lobes black.

DEUTERODON[13] Eigenmann gen. nov.

A genus of Tetragonopterinæ distinguished as most of the genera of Caracidæ by its dentition.

Teeth in the premaxillary in two series, those of the outer series few (2 on each side), and separated from each other, expanded at the tip, each with a large median and two small lateral cusps; teeth of the second row very broadly expanded at the tip, each with a long, pointed median cusp and three graduated cusps on the sides; the teeth becoming smaller, but not notably so toward the sides, 5 on each side; maxillary with a few (2 on one side, 3 on the other), similar teeth; mandible with a single series of teeth, 10 on each side, regularly graduated from in front back; the teeth little expanded at the tip, each with a large and strong median cusp and two or three much smaller lateral cusps; the teeth and jaws so arranged that their action is shear-like, in contrast to *Astyanax* and related genera where the lower jaw is apparently thrown forward when opened and its anterior teeth point up and back when it is closed, the arrangement being similar to that in the Mylinæ, the second series of teeth in *Astyanax* being further back than in the present genus. Gill-rakers setiform as in *Astyanax*; no precumbent dorsal spine; nares close together; gill-membranes free from the isthmus and from each other; lateral line complete. Eats plants. Its teeth enable it to cut out pieces of aquatic plants with great neatness.

71. *Deuterodon iguape* Eigenmann sp. nov. (Plate XLI, Fig. 3).

Type No. 9265, a specimen 110 mm. long from Iguape collected by Dr. H. von Ihering.

Tetragonopterus fasciatus Eigenmann & Norris (not Cuvier). Revista Museu Paulista, IV, 357.

[13] δεύτερος repeated, ὀδούς tooth; in allusion to the similarity of the mandibular teeth.

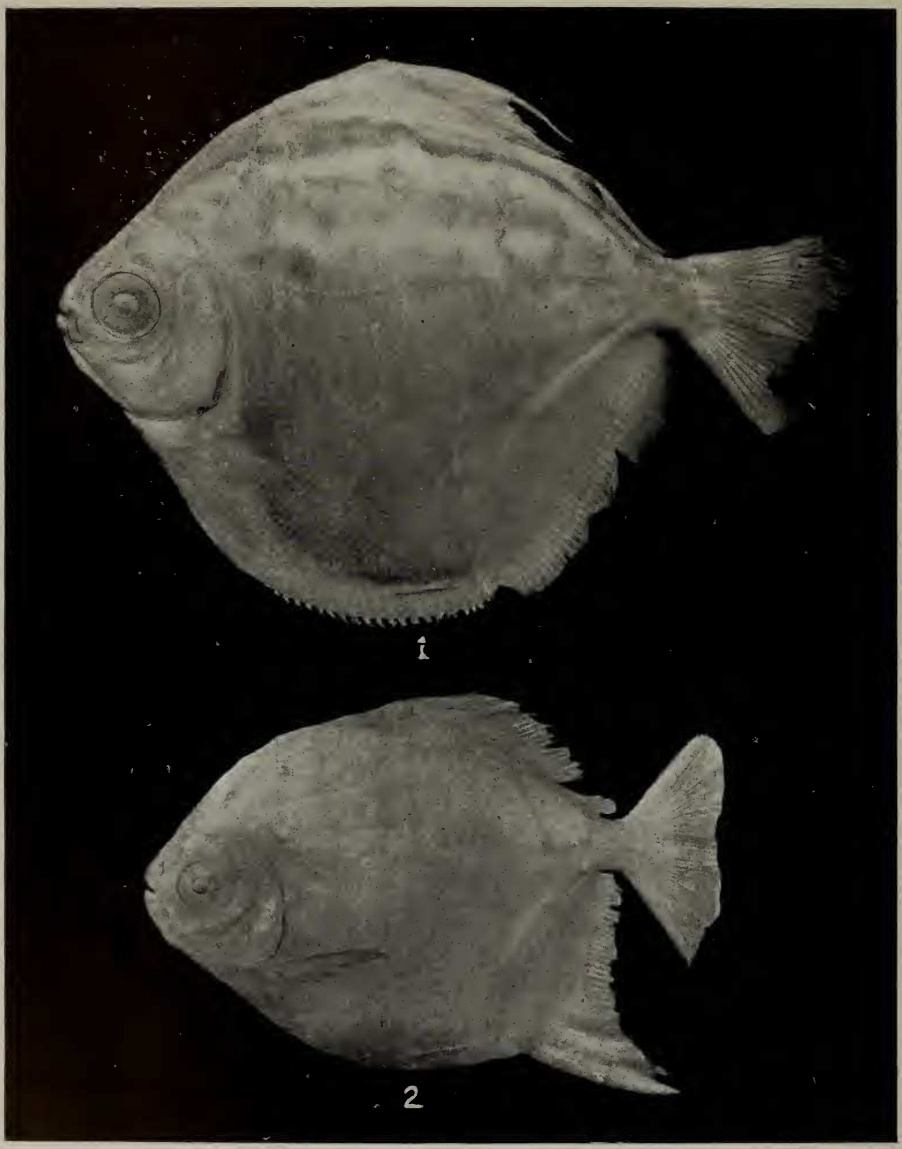


Fig. 1. *Metynnis mola* (Eigenmann and Kennedy).
Fig. 2. *Myleus levis* Eigenmann and McAtee.

This species is the image of *Astyanax fasciatus* Cuvier, but differs generically from the species in the character of the teeth.

Head 3.75; depth 2.6; D. 11; A. 2,22; scales 6–34–5.

Dorsal and ventral profiles nearly equally curved in front of the dorsal and ventrals; head somewhat pointed, the snout rather long; mouth nearly horizontal, the maxillary oblique, reaching at least to front of pupil; eye large, equal to snout in length, 3⅓ in head, less than interorbital width.

Origin of dorsal slightly behind origin of ventrals, a little nearer tip of snout than base of middle caudal rays, its height less than length of head; anal moderate, its margin slightly concave; ventrals not reaching anal; pectorals not to ventrals.

Free margins of the scales with a series of non-converging sub-parallel lines.

In alcohol, straw color; a silvery lateral band overlying a dark band; a well-marked round humeral spot smaller than eye; a well-defined caudal spot continued to the end of the middle rays; no other marks on the fins.

72. *Chalcinus angulatus* Agassiz.

Chalcinus angulatus curtus E. & K., l. c., 24.

Bahia Negra (384), Corumba (360).

73. *Thoracocharax stellatus* (Kner).

Bahia Negra (385) and Corumba (357).

74. *Pygocentrus nattereri* (Kner) Piranha.

Rio Paraguay at Porto Murtinho, and Corumba (285 and 342).

75. *Serrasalmo spilopleura* Kner. Piray, Pirambé.

Rio Otuquis; Rio Paraguay at Ascuncion, and Porto Murtinho (278, 284, 377, 378, 395).

76. *Serrasalmo humeralis* Cuvier and Valenciennes, Pirambéva. (Plate XXXIII, Fig. 2).

Porto Murtinho (384), Bahia Negra (410).

77. *Metynnis mola* (Eigenmann & Kennedy) (Plate XLII, Fig. 1).

A specimen somewhat larger (No. 376) than any of those recorded before, may be different. It is from the Rio Otuquis. A. 37; D. 18; ventral serræ 29–2, none of them two-pointed; back under dorsal without cross-bands, cross shades behind the dorsal. Sides below the lateral line and along the lateral line spotted.

In two small specimens (No. 361) from Puerto Murtinho, Matto Grosso, there are no cross-bands on back.

78. *Mylossoma albiscopus* (Cope) Piranha.

Bahia Negra (394).

79. *Myleus levis* Eigenmann & McAtee, sp. nov. (Plate XLII, Fig. 2).

Type No. 10156, Bahia Negra, Dec., 1901 (296) 143 mm.

Head 3.5 ; depth 1.5 ; D. 27 ; A. 36 ; abdominal serræ 45 ; lat. line about 112.

Form rather polygonal ; nearly straight or slightly concave from snout to end of occipital crest, thence to within 2 cm. of the dorsal fin the anterior margin is strongly arched, thence is straight to the dorsal. From the front of the dorsal to the caudal the back is evenly curved. Caudal peduncle slender, about equal to eye, 2.8 in head. The basis of the anal is straight and meets the ventral profile at a large angle (about 60 degrees). The ventral surface is bounded by a straight, horizontal outline from anal to a point slightly in advance of the ventrals, thence evenly arching to in front of the pectoral, where it is slightly concave.

Lateral line complete, decurved from above middle of pectoral to below end of dorsal.

Opercle rounded ; maxillary small, strap-shaped, partly sheathed in first suborbital, not reaching eye. Mandible with 5 strong teeth on each side, the inner 3 large and with slightly wavy edges, the outer two quite small. There are 2 hooked, conical teeth in the middle behind the anterior row ; premaxillaries with two series of teeth, the outer composed of 10 teeth similar to those of the mandible and the inner with 4 broad, concave-topped teeth in a straight row across the jaw. Jaws equal ; snout .8 in eye.

Dorsal fin rounded, highest in front. Caudal broad, subtruncate ; pectorals 1.2 in head ; ventrals narrow, 2 in head, not reached by the pectorals, nor reaching vent. Anal strongly falcate, the third ray very long and heavy, 1.2 times head.

Color plain dark brown, lighter below lateral line. Fins clear, except a wide basal portion of the dorsal dusky and a heavy black blotch on the margin of the anal from the longest to the 13th ray, widest on the 4th and 6th rays.

80. *Charax caliurus* Eigenmann & Kennedy, sp. nov. (Plate XLIII, Fig. 1.)

In Proc. Acad. Sci. Phila., Eigenmann & Kennedy describe a specimen, No. 9969 of the I. U. Collection. It was supposed to be the young of *squamosus*. The present collection contains specimens of

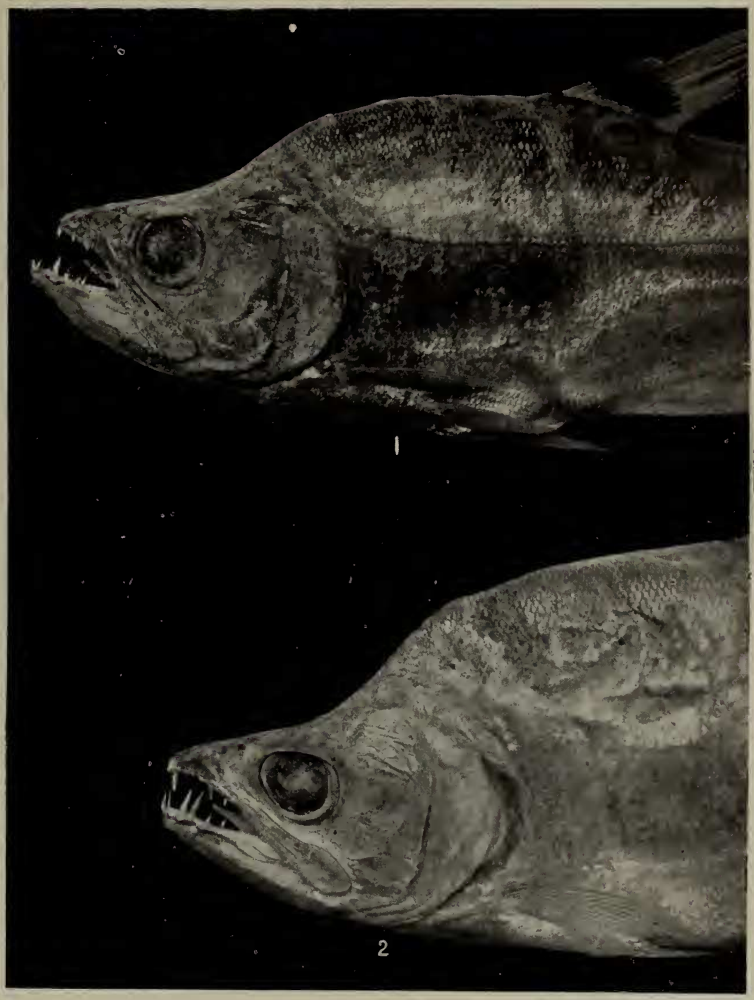


Fig. 1. *Charax caliurus* Eigenmann and Kennedy.
Fig. 2. *Charax squamosus* Eigenmann and Kennedy.

squamosus ranging from 70 to 280 mm. These leave no doubt that the specimen (No. 9969) under consideration represents a distinct and most strikingly marked species of the genus.

81. *Charax squamosus* (Eigenmann & Kennedy) (Plate XLIII, Fig. 2).

Of this species we have a specimen from Bahia Negra (404) 230 mm. to base of caudal. The profile becomes more and more concave with age, as the result of the humping of the nape, so that in the largest specimen the depression is 6 mm. below the line joining the tip of the snout and the nape. Formalin specimens all show a distinct humeral spot, a larger caudal spot and a well-defined black band uniting the two. In alcoholic specimens the humeral spot is not apparent and the black lateral band is hidden by the silvery band overlying it.

82. *Cynopotamus knerii* Steindachner.

Specimens from Bahia Negra (373) and Corumba (341).

83. *Rœboides bonariensis* Steindachner, Soirú pintada.

Corumba (356). It is very probable that this specimen, as well as those mentioned as *microlepsis* by Eigenmann & Kennedy, are *R. bonariensis*.

84. *Rœboides prognathus* Boulenger.

Rio Otuquis (371).

85. *Acestrorhynchus ferox* Günther. Pez de Cachorro.

Corumba (332).

GYMNOTIDÆ.

86. *Eigenmannia virescens* (Val.) Cubiha.

Corumba (293, 346).

87. *Sternopygus macrurus* Bloch & Schneider.

Corumba (294).

88. *Gymnotus carapus* Linnæus.

Corumba (295).

PŒCILIIDÆ.

89. *Girardinus caudomaculatus* Hensel.

Numerous specimens; exceedingly abundant in a mountain brook, Arroyo Itoroto at Sapucay (458).

BELONIDÆ.

90. *Potamoraphis guianensis* (Schomburgk). Pez d'Aquelha.

Tuyuyu (298).

SCIÆNIDÆ.

91. *Pachyurus bonariensis* Steindachner.
Corumba (250).

CICHLIDÆ.

92. *Chætobranchopsis australe* Eigenmann & Ward, sp. nov. (Plate XLIV, Fig. 1).

Type No. 10157, one specimen 110 mm. to base of caudal.
Bahia Negra.

Profile from tip of snout to occipital region straight, thence evenly curved to base of caudal. Depth 1⅔, head 1½; eye 3½ in head, 1 in snout, 1⅔ in interorbital. Cleft of mouth oblique, not reaching to the vertical from the orbit; cheek scaled; upper part of operculum scaled; 14 scales in front of dorsal; 10 scales in front of ventrals. Dorsal spines of medium strength, increasing in height posteriorly, the highest being 1½ times orbital diameter; pectoral long, some of the rays in the upper half much produced, longer than head, reaching to origin of second half of anal; ventrals produced in a filament which reaches to 3d anal ray. Anal and caudal fins densely scaled; soft dorsal with a very few, indistinct scales at base. Color light brown; a dark blotch on cheek and a dark spot on sides below lateral line; ventral and anal fins margined with black.

D. XIV, 13; A. V, 16; lat. l. 19 + 10; depth, 1⅔.

C. orbicularis from the Amazon has fifteen dorsal and six anal spines.

93. *Æquidens tetramerus* (Heckel). Cará.

Ascuncion; tributary of Paraguay in Chaco Paraguayo; Corumba; Bahia Negra; Puerto Max and Villa Rica (288, 343, 381, 391, 415, 468). An examination of 9 specimens gives D. XV, 10 in all specimens; A. III, 9 in seven; III, 10 in two; lat.l. 16 + 10 in one; 17 + 8 in three, and 17 + 9 in five specimens.

94. *Æquidens paraguayensis* Eigenmann & Kennedy (Plate XLIV, Fig. 2).

Ascuncion; Corumba; Rio Otuquis; Puerto Max (414, 417, 418, 282, 284, 326, 369, 379, 391).

An examination of 29 specimens gave the formulas; D. XIII, 10 in one specimen; XIV, 9 in 21; XIV, 10 in 3 and XV, 9 in 4 specimens. A. III, 7 in one, III, 8 in 18 and III, 9 in 10; lat. l. constant, 16 + 10. Of the specimens with A. III, 9, six came from a mountain brook at Sapucay (454).

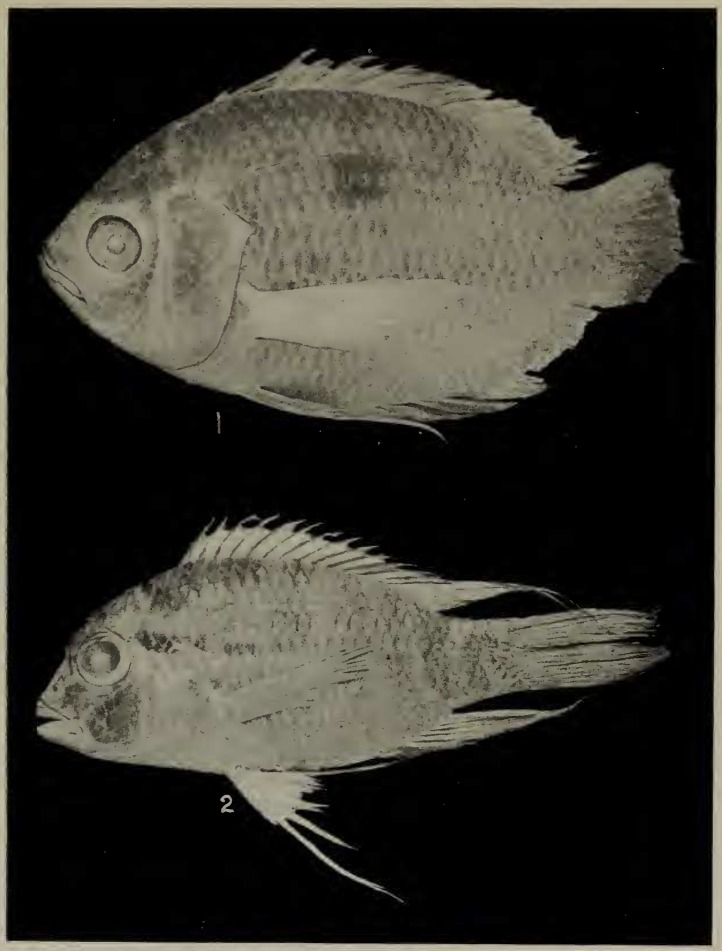


Fig. 1. *Chætobranchopsis australe* Eigenmann and Ward.
Fig. 2. *Æquidens paraguayensis* Eigenmann and Kennedy.

95. *Mesonauta festivus* (Heckel) (Plate XLV, Fig. 1).

Corumba (334).

96. *Batrachops semifasciatus* Heckel.

Crenicichla saxatilis Eigenmann & Kennedy, Proc. Phila. Acad. Sci., 1903, 535.

The specimen mentioned by E. and K. is in bad condition. It was collected in a laguna near the Paraguay. It should probably stand as *semifasciata* instead of *saxatilis*: D. XXII, 11; A. III, 8; scales 55.

97. *Crenicichla lepidota* Heckel. Juan Agenza.

Ascuncion (416, 277); Tributary of the Paraguay in Chaco, Paraguayo (289); Corumba (325); lat. l. 40–42.

98. *Crenicichla brasiliensis adspersa* Heckel. Juan Agenza.

Corumba (337). This specimen is most nearly like *adspersa* Heckel, from which it differs in having no spots on the body in front.

99. *Geophagus jurupari* Heckel.

Geophagus pappaterra Eigenmann & Kennedy (not Heckel), Proc. Acad. Sci. Phila., 1903, 536. Laguna near Arroyo, Trementina, Corumba (370).

100. *Heterogramma trifasciatum* Eigenmann & Kennedy (Plate XLV, Fig. 2).

Five additional specimens of this species enable us to revise the diagnosis. We take the opportunity to correct a typographical error. The "D. X, 6" should read D. XVI, 6. "Type No. 10066" should read "Type No. 10155."

The specimens of this species at hand are: 1. The Type No. 10-155, 34 mm. from the Arroyo Chagalalina. 2. Five specimens, 20, 24, 25 and 50 mm. long (parts of 315, 318, 324), from Corumba.

All these specimens agree in color pattern underscored. *There is a well-defined black line from the lower margin of the pectoral to the origin of the anal,* and continued more or less distinctly to the tip of the first ray; anal behind this uniformly dusky or alternately light and dusky; *a dark streak from eye down and back to the angle of sub- and interopercle; a dark band from tip of snout to the distinct caudal spot,* the band narrowest on head and showing no indications of breaking up on the sides or enlarging into a lateral spot; base of dorsal more or less dusky; in one of the specimens there are indications of cross shades on the tail; first two membranes of the spinous dorsal black in most of the specimens; ventrals with a large black spot; caudal uniform, dusky.

D. XVI, 6–XV, 7; A. III, 6–III, 7; head 3; depth 2¾.

The lateral line ascends rapidly; tubes are variously developed, ranging from 5–10 on the anterior part of the lateral line; behind the tubes the scales contain inconspicuous pores only, which are on the row of scales next to the dorsal for a distance, but further back they shift down on the sides to the next row of scales. On the posterior section of the lateral line tubes are variously developed from none at all to 3 next to the caudal, the remainder of the line being represented by pores.

101. *Heterogramma corumbæ* Eigenmann & Ward sp. nov. (Plate XLV, Fig. 3).

Type No. 10166, one specimen, 30 mm., Corumba (303).

Cotypes No. 10167, nine specimens, 22–35 mm., Corumba. (312, part of 315, part of 318, part of 324.)

Two specimens, 27 and 37 mm. from a forest laguna (392), near Puerto Max in water saturated with calcium (gypsum?).

The cotypes were evidently associated with *Biotodoma fasciatus*, inasmuch as they were mixed with specimens of the latter under the same collector's number. The species which they represent, if different from *trifasciatus*, is in shape and fin-formula very similar to that species. In color, in which they all agree, they differ very strikingly from *trifasciatus*. There is the same streak from the eye down and back, a similar dusky area along the base of the dorsal and the same lateral band, but the edges of the latter tend much more frequently to become jagged than in *trifasciatus* and the caudal spot is much larger and more intense than in the latter species; the most striking difference comes below the lateral band. *Here there are two or three more or less interrupted lines following the series of scales and parallel with the lateral band;* faint cross bands extend along the entire sides; ventrals as in *trifasciatus* with a large black spot or streak; anal and soft dorsal more or less barred; caudal distinctly crossbarred.

Head 3; depth 2⅔; D. XVI, 6; A. III, 6–7; lat. l. 9–11 + 0–8; 22 scales along median line.

Eye large, ¾ in snout, 3 in head; scales large; the lateral line very poorly developed, the number of developed tubes varying greatly, both in the anterior and posterior portions. Pectorals reaching to vent; ventral to anal; anal and dorsal to caudal.

102. *Heterogramma borelli* Regan.

Six specimens from Corumba (part of 312 and 324).

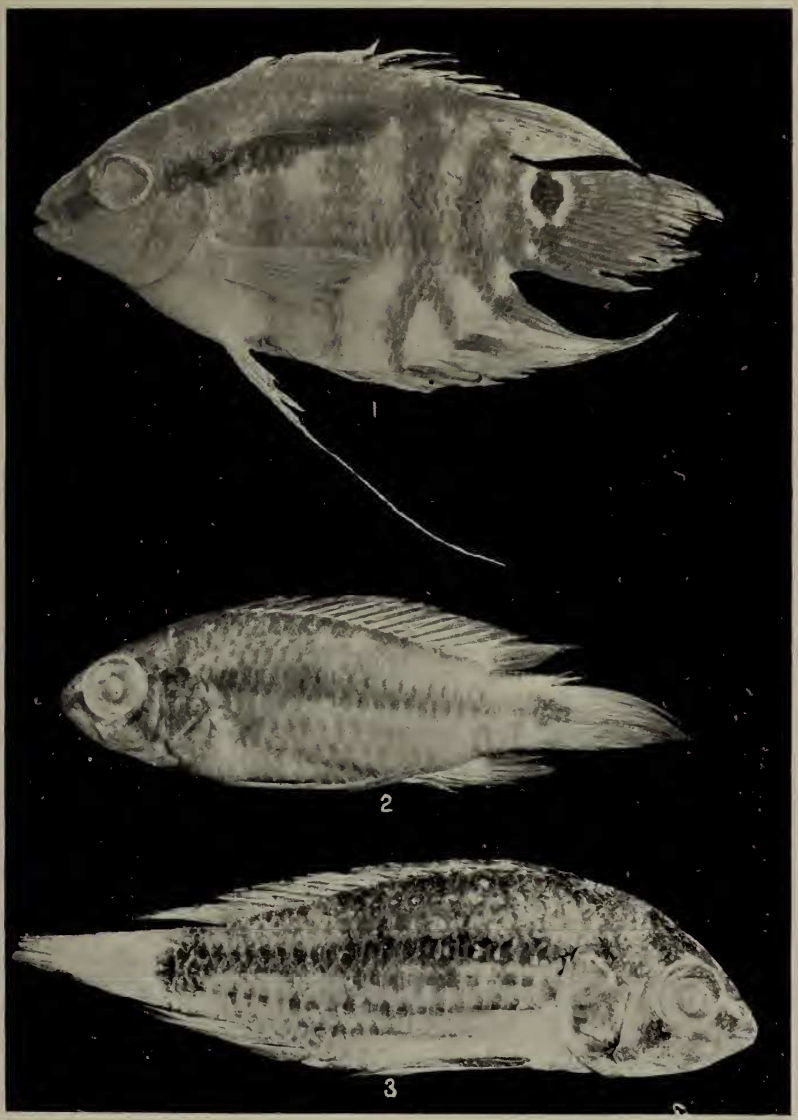


Fig. 1. *Mesonauta festivus* (Heckel).
Fig 2. *Heterogramma trifasciatum* Eigenmann and Kennedy.
Fig. 3. *Heterogramma corumbæ* Eigenmann and Ward.

These specimens differ but slightly from Günther's and Steindachner's descriptions of *tæniatum*, hitherto known only from the Amazon. Dorsal XIV–XVI, 5½; A.III, 5½ to 6½. Depth $2\frac{2}{3}$–(3); head 3 (3); head as long as high (longer); eye 3 in the head, longer than snout, equals interorbital; preorbital 2 in eye; highest dorsal spine equals length of eye or a little longer; soft dorsal and anal reaching middle of caudal when laid back; caudal rounded; pectorals about reaching anal, the threads of the ventrals beyond origin of anal.

Lateral line with 4–7 canals, 21–23 scales in the lateral series. A dark streak from eye forward, another downward and backward; a black band broken into spots along the middle of the sides to the end of the caudal; a series of dark spots along the base of the dorsal; anterior margin of anal and outer pectoral ray sometimes black.

ACHIRIDÆ.

103. *Achirus jenynsii* (Günther).
Corumba (347).

LIST OF FISHES SO FAR RECORDED FROM THE BASIN OF THE PARAGUAY.

In the following list one star (*) indicates that the species is peculiar to the basin of the Paraguay; two stars (**) that both the genus and species are peculiar to it; A indicates that the *species* is also found in the basin of the Amazon; B, that the *genus* is found in the basin of the Amazon; P, that the species is peculiar to the basin of the La Plata; C, that the species is also found in the coast streams of eastern Brazil, and S, that it is found in the Rio San Francisco.

TRYGONIDÆ.

1. A. *Potamotrygon hystrix* Müller & Troschel.
2. A. *Potamotrygon dumerili* Castlenau.

ASPREDINIDÆ.

3. B.* *Dysichthys australe* Eigenmann & Ward.
4. B.* *Bunocephalus rugosus* Eigenmann & Kennedy.
5. B. P. *Bunocephalus iheringi* Boulenger.
6. B.* *Bunocephalus doriæ* Boulenger.

SILURIDÆ.

PIMELODINÆ.

7. A. *Pinarampus pirinampu* (Spix).
8. B. A. *Luciopimelodus platanus* Günther.
9. A. S. *Pseudopimelodus zungaro* (Humboldt).
10. * *Pseudopimelodus cottoides* Boulenger.
11. A. C. *Rhamdia quelen* (Quoy & Gaimard).
12. P. *Heptapterus mustelinus* Valenciennes.
13. A. *Rhamdia sebæ kneri* Steindachner.
14. A. *Pimelodus ornata* Kner.
15. * *Pimelodus albicans* (Cuvier & Valenciennes).
16. A. S. *Pimelodus clarias* (Bloch).
17. S. *Pimelodus valenciennis* (Kröyer).
18. A. S. *Pimelodus fur* Reinhardt.
19. ** *Iheringichthys labrosus* (Lütken).
20. ** *Iheringichthys megalops* Eigenmann & Ward.
21. A. *Pimelodella gracilis* (Valenciennes).
22. * *Pimelodella tæniophorus* Regan.
23. A. C. S. *Pimelodella lateristriga* (Müller & Troschel).
24. * *Pimelodella mucosa* Eigenmann & Ward.
25. A. *Sciades pictus* (Müller & Troschel).
26. A. *Hemisorubim platyrhynchus* (Cuvier & Valenciennes).
27. B. S. *Pseudoplatystomus coruscans* (Agassiz).
28. A. *Sorubim lima* (Bloch & Schneider).

DORADINÆ.

29. A. *Doras granulosus* Valenciennes.
30. A. S. *Doras costatus* (Linnæus).
31. * *Doras maculatus* Valenciennes.
32. * *Doras nebulosus* Eigenmann & Kennedy.
33. A. *Doras weddeli* Castelnau.
34. B.* *Oxydoras kneri* (Bloch).
35. * *Oxydoras eigenmanni* (Boulenger).
36. * *Hemidoras paraguayensis* Eigenmann & Ward.

AUCHENIPTERINÆ.

37. B. A. *Trachelioptcrus coriaceus* (Cuvier & Valenciennes).
38. * *Auchenipterus nigripinnis* (Boulenger).

39. A. S. *Trachycorystes galeatus* (Linnæus).
40. A. C. *Trachycorystes striatulus* (Steindachner).

AGENIOSINÆ.

41. A. *Ageneiosus valenciennes* Bleeker.
42. A. *Ageneiosus brevifilis* (Cuvier & Valenciennes).

HYPOPHTHALMIDÆ.

43. A. *Hypophthalmus edentatus* Spix.

PYGIDIIDÆ.

44. * *Pygidium borelli* Boulenger.
45. * *Pygidium brasiliense* (Reinhardt).
46. P. *Pygidium cordovensis* (Weyenberg).
47. ** *Homodiætus anisitsi* Eigenmann & Ward.

LORICARIIDÆ.

PLECOSTOMINÆ.

48. A. *Plecostomus plecostomus* (Linnæus).
49. C. *Plecostomus johni* Steindachner.
50. C. *Plecostomus commersoni* (Valenciennes).
51. C. *Plecostomus vaillanti* Steindachner.
52. * *Plecostomus borelli* Boulenger.
53. A. C. *Plecostomus robini* Cuvier & Valenciennes.
54. C. S. *Plecostomus wuchereri* Günther.
55. A. *Hemiancistrus vittatus* (Steindachner).
56. A. *Cochliodon cochliodon* Kner.
57. * *Pterygoplichthys multiradiatus* (Bloch).
58. * *Pterygoplichthys anisitsi* Eigenmann & Kennedy.
59. * *Pterygoplichthys juvens* Eigenmann & Kennedy.
60. * *Pterygoplichthys gigas* Boulenger.
61. A. *Pseudancistrus barbatus* (Cuvier & Valenciennes).
62. A. *Xenocara gymnorhynchus* (Kner).
63. B. A. *Ancistrus cirrhosus* Valenciennes.
64. A. *Ancistrus cirrhosus dubius* Eigenmann & Eigenmann.
65. A. *Ancistrus hoplogenys* (Günther).
66. * *Oxyropsis inexpectatum* Holmberg.
67. * *Otocinclus vittatus* Regan.

LORICARIINÆ.

68. A. *Hemiodontichthys acipenserinus* (Kner).
69. B.* *Sturisoma robusta* Regan.
70. * *Sturisoma barbata* Kner.
71. * *Loricaria parva* Boulenger.
72. P. *Loricaria catamarensis* Berg.
73. A. *Loricaria phoxocephala* Eigenmann & Eigenmann.
74. * *Loricaria maculata* Bloch.
75. A. *Loricaria typus* Bleeker.
76. * *Loricaria labialis* Boulenger.
77. P. *Loricaria anus* Valenciennes.
78. A. *Loricaria cataphracta* Linnæus.
79. A. *Loricaria carinata* Castelnau.
80. * *Loricaria apeltogaster* Boulenger.
81. * *Loricaria macrodon* Kner.
82. * *Loricaria laticeps* Regan.
83. * *Loricaria platycephala* Kner.

CALLICHTHYIDÆ.

84. B.* *Corydoras microps* Eigenmann & Kennedy.
85. * *Corydoras paleatus* (Jenyns).
86. * *Corydoras aurofrenatus* Eigenmann & Kennedy.
87. * *Corydoras australe* Eigenmann & Ward.
88. A. C. *Callichthys callichthys* (Linnæus).
89. * *Callichthys callichthys asper* Quoy & Gaimard.
90. * *Callichthys callichthys hæmiphractus* Hensel.
91. * *Hoplosternum pectoralis* (Boulenger).
92. A. *Hoplosternum littorale* (Hancock).

CHARACIDÆ.

ERYTHRININÆ.

93. A. C. S. *Hoplias malabaricus* (Bloch).
94. A. C. *Hoplerythrinus unitæniatus* (Spix).

PYRRHULININÆ.

95. * *Pyrrhulina australe* Eigenmann & Kennedy.
96. A. *Pyrrhulina brevis* Steindachner.

CURIMATINÆ.

97. B.* *Psectrogaster curviventris* Eigenmann & Kennedy.
98. A. *Curimatella alburnus* (Müller & Troschel).
99. * *Curimatella alburnus australe* Eigenmann & Kennedy.
100. A. *Curimatus spilurus* Günther.
101. * *Curimatus gilli* Eigenmann & Kennedy.
102. A. *Curimatus nasus* Steindachner.
103. * *Curimatus nigrotænia* Boulenger.
104. * *Curimatus elegans nitens* Holmberg.
105. A. *Curimatus bimaculatus* Steindachner.
106. A. *Curimatus rutiloides* Kner.
107. C. *Curimatus gilberti* Quoy & Gaimard.
108. B. A. *Anodus latior* Spix.

CHILODINÆ.

109. B. S. *Prochilodus argenteus* Agassiz.
110. C. *Prochilodus scrofa* Steindachner.
111. P. *Prochilodus lineatus* (Valenciennes).

HEMIODONTINÆ.

112. * *Anisitsia othonops* Eigenmann & Kennedy.
113. A. *Hemiodus unimaculatus* (Bloch).
114. * *Hemiodus semitæniatus* Kner.
115. A. *Hemiodus microlepis* Kner.
116. A. *Parodon suborbitalis* Cuvier & Valenciennes.
117. * *Parodon gestri* Boulenger.
118. * *Parodon paraguensis* Steindachner.
119. * *Parodon tortuosus* Eigenmann & Norris.

ANOSTOMATINÆ.

120. ** *Schizodon borelli* (Boulenger).
121. S. *Schizodon isognathus* Kner.
122. A. *Schizodon dissimilis* (Garman).
123. A. *Schizodon fasciatus* (Spix).
124. A. *Lahilliella nasutus* (Kner).
125. A. *Leporinus striatus* Kner.
126. A. C. *Leporinus frederici* (Bloch).
127. A. *Leporinus obtusidens* (Valenciennes).

128. A. *Leporinus trifasciatus* Steindachner.
129. A. *Leporinus eques* Steindachner.
130. A. *Leporinus affinis* Günther.
131. A. *Leporinus hypselonotus* Günther.
132. A. C. *Leporinus conirostris* Steindachner.
133. A. *Leporinus fasciatus* (Bloch).
134. A. C. *Characidium fasciatum* Reinhardt.
135. B. * *Characidium lateralis* (Boulenger).

TETRAGONOPTERINA.

136. B.* *Odontostilbe paraguayensis* Eigenmann & Kennedy.
137. * *Odontostilbe trementinæ* Eigenmann & Kennedy.
138. * *Cheirodon ribeiroi* Eigenmann.
139. B. * *Cheirodon interruptus* (Jenyns).
140. * *Cheirodon calliurus* Boulenger.
141. A. *Cheirodon insignis* Steindachner.
142. A. *Cheirodon nattereri* Steindachner.
143. A. *Holoshesthes pequira* (Steindachner).
144. * *Aphyocharax dentatus* Eigenmann & Kennedy.
145. A. *Aphyocharax alburnus* Günther.
146. * *Aphyocharax stramineus* Eigenmann.
147. A. *Aphyocharax anisitsi* Eigenmann & Kennedy.
148. * *Aphiocharax rathbuni* Eigenmann.
149. A. S. *Hemigrammus gracilis* Reinhardt.
150. ? *Hemigrammus callistus* (Boulenger).
151. * *Hemigrammus anisitsi* Eigenmann.
152. C. *Hemigrammus lütkeni* (Boulenger)
153. C. *Hemigrammus ulreyi* (Boulenger).
154. * *Hemigrammus tridens* Eigenmann.
155. ** *Hemigrammus kennedyi* Eigenmann.
156. A. *Tetragonopterus argenteus* Cuvier.
157. A. C. *Tetragonopterus orbicularis* Cuvier & Valenciennes.
158. * *Tetragonopterus alleni* Eigenmann & McAtee.
159. * *Tetragonopterus ternetzi* Boulenger.
160. A. *Astyanax fasciatus* (Cuvier).
161. P. *Astyanax iheringi* (Boulenger).
162. A. *Astyanax hauxwellianus* (Cope).
163. * *Astyanax pelegrini* Eigenmann & Kennedy.
164. A. *Astyanax abramis* (Jenyns).

165. * *Astyanax moorii* (Boulenger).
166. A. *Astyanax bimaculatus* (Linnæus).
167. * *Astyanax bimaculatus lineatus* (Holmberg).
168. A. B. *Astyanax rutilus* (Jenyns).
169. * *Astyanax moenkhausi* Eigenmann & Kennedy.
170. A. *Moenkhausia agassizi* (Steindachner).
171. * *Moenkhausia dichrourus* (Kner).
172. A. *Moenkhausia lepidurus* (Kner).
173. ** *Bryconamericus exodon* Eigenmann.
174. B. *Brachychalcinus retrospina* Boulenger.[15]
175. * *Brycon hilari* (Cuvier & Valenciennes).
176. * *Brycon microlepis* Perugia.
177. A. *Creatochanus melanurus* (Bloch).
178. P. *Bryconodon orbignianus* (Cuvier & Valenciennes).

GASTEROPELICINÆ.

179. A. *Thoracocharax stellatus* (Kner).
180. * *Chalcinus paranensis* Günther.
181. A. *Chalcinus angulatus* Spix.
182. *Chalcinus angulatus curtus* Garman.

SERRASALMONIÆ.

183. A. S. *Pygocentrus piraya* (Cuvier).
184. A. *Pygocentrus nattereri* (Kner).
185. A. *Pygopristis serrulatus* Cuvier & Valenciennes.
186. A. S. *Serrasalmo marginatus* Valenciennes.
187. A. *Serrasalmo spilopleura* Kner.
188. A. *Serrasalmo gymnogenys* Gunther.
189. A. *Serrasalmo humeralis* Cuvier & Valenciennes.
190. A. *Serrasalmo rhombeus* (Linnæus).

[15] *Fowlerina paraguayensis* Eigenmann should be added here. *Fowlerina* is a new genus for *Tetragonopterus compressus* Günther. It is allied to *Brachychalcinus* and *Stethaprion*, differing from the former by having a leaf-like or scale-like predorsal spine, and from the latter in having less than 40 scales in the lateral line. *Tetragonopterus compressus* has anal II, 31½. The Paraguayan specimens in the British Museum have:

2 specimens from Santa Cruz. A. II, 34½.

3 specimens from San Luis. A. III, 34½.

5 specimens from Descalvados. A. II, 35; I, 36½, and III, 34½.

These having uniformly a larger number of anal rays may be termed *Fowlerina paraguayensis*.

MYLINÆ.

191. * *Metynnis mola* Eigenmann & Kennedy.
192. A. *Metynnis hypsauchen* (Müller & Troschel).
193. A. *Myleus asterias* (Müller & Troschel).
194. * *Myleus levis* Eigenmann & McAtee.
195. A. *Mylossoma aureus* (Agassiz).
196. A. *Mylossoma albiscopus* (Cope).
197. A. *Piaractus brachypomus* (Cuvier).

CHARACINÆ.

198. A. *Charax gibbosus* (Linnæus).
199. * *Charax squamosus* Eigenmann & Kennedy.
200. * *Charax calliurus* Eigenmann.
201. A. *Rœstes molossus* (Kner).
202. A. *Rœboides microlepis* (Reinhardt).
203. P. *Rœboides bonariensis* Steindachner.
204. * *Rœboides prognathus* (Boulenger).
205. A. *Cynopotamus humeralis* (Valenciennes).
206. A. *Cynopotamus kneri* Steindachner.
207. ? *Cynopotamus magdalenæ* (Steindachner).[16]
208. A. *Salminus brevidens* Cuvier.

ACESTRORHAMPHINÆ.

209. A. *Acestrorhynchus ferox* (Günther).
210. C. *Acestrorhamphus hepsetus* (Cuvier).

CYNODONTINÆ.

211. A. *Raphiodon vulpinus* Spix.

STERNOPYGIDÆ.

212. A. *Sternarchus albifrons* Linnæus.
213. A. *Rhamphichthys reinhardti* Kaup.
214. A. *Rhamphicthys marmoratus* Castlenau.
215. A. *Hypopomus brevirostris* Steindachner.
216. A. S. *Sternopygus macrurus* (Bloch and Schneider).
217. A. S. *Eigenmannia virescens* (Valenciennes).
218. A. S. *Gymnotus carapo* Linnæus.

[16] The record of this species for the Paraguay is on the authority of Perugia. It probably should be eliminated.

SYNBRANCHIDÆ.

219. B. A. *Synbranchus marmoratus* Bloch.

STOLEPHORIDÆ.

220. A. *Stolephorus olidus* Günther.

PŒCILIIDÆ.

221. A. *Rivulus punctatus* Boulenger.
222. A. *Girardinus caudomaculatus* Hensel.
223. C. *Cnesterodon decemmaculatus* (Jenyns).
224. B. * *Fundulus paraguayensis* Eigenmann & Kennedy.
225. B. * *Fundulus balzanii* (Perugia).
226. * * *Ilyodon paraguayense* Eigenmann.

BELONIDÆ.

227. A. *Potamorrhaphis guianensis* (Schomburgk).
228. A. *Tylosurus amazonicus* (Steindachner).

SCIÆNIDÆ.

229. P. *Pachyurus bonariensis* Steindachner.
230. A. *Pachyurus schomburgkii* Günther.
231. B. * *Plagioscion ternetzi* Boulenger.

CICHLIDÆ.

232. B. * *Chætobranchopsis australe* Eigenmann & Ward.
233. A. *Astronotus ocellatus* (Agassiz).
234. A. *Æquidens tetramerus* (Heckel).
235. C. *Æquidens portalagrensis* (Heckel).
236. A. *Æquidens dorsigera* (Heckel).
237. * *Æquidens paraguayensis* Eigenmann & Kennedy.
238. A. *Æquidens vittata* (Heckel).
239. A. *Cichlasoma bimaculata* (Linnæus).
240. B. * *Heterogramma corumbæ* Eigenmann & Ward.
241. ** *Heterogramma borelli* Regan.
242. ** *Heterogramma trifasciatum* Eigenmann & Kennedy.
243. A. *Mesonauta festivus* (Heckel).
244. A. *Crenicichla lepidota* Heckel.
245. A. *Crenicichla adspersa* Heckel.
246. A. *Crenicichla vittata* Heckel.

247. A. *Crenicichla saxatilis* (Linnæus).
248. B. * *Batrachops ocellata* Perugia.
249. P. *Batrachops semifasciatus* Heckel.
250. * *Batrachops ocellatus* Perugia.
251. A. *Satanoperca pappaterra* Heckel.
252. B. * *Geophagus balzanii* Perugia.
253. A. *Geophagus jurupari* Heckel.

PLEURONECTIDÆ

254. P. *Achirus jenynsii* (Günther).

Total, two hundred and fifty-four species. Of these ninety-five are, as far as known, peculiar to the basin of the Paraguay; one hundred and thirty-two, or over half, are common to the basins of the Amazon and the Paraguay. Only twenty-one are also found in the coast streams north of Rio de Janeiro, while eighteen are also fouud in the Rio San Francisco.

EXPLANATION OF PLATES.

PLATE XXXI.

Figs. 1–2. *Dysichthys australe* Eigenmann & Ward. Type and cotype.

PLATE XXXII.

Fig. 1. *Pimelodella mucosa* Eigenmann & Ward. Type.
Fig. 2. *Pimelodella gracilis* Valenciennes.
Fig. 3–4. *Iheringichthys megalops* Eigenmann & Ward. Type.

PLATE XXXIII.

Fig. 1. *Iheringichthys labrosus* (Kröyer).
Fig. 2. Dentition of *Serrasalmo humeralis* Cuv. & Val.

PLATE XXXIV.

Fig. 1. *Hemidoras paraguayensis* Eigenmann & Ward. Type.
Figs. 2–3. *Homodiætus anisitsi* Eigenmann & Ward. Type.

PLATE XXXV.

Fig. 1. *Hemiodontichthys acipenserinus* Eigenmann & Eigenmann.
Fig. 2–3. *Loricaria typus* (Bleeker).

PLATE XXXVI.

Figs. 1–3. *Sturisoma robusta* (Regan).

PLATE XXXVII.

Figs. 1–2. *Loricaria carinata* Castelnau.
Figs. 3–4. *Loricaria labialis* Boulenger.

PLATE XXXVIII.

Fig. 1. *Otocinclus vittatus* Regan.
Fig. 2–3. *Corydoras microps* Eigenmann & Kennedy.
Fig. 4. *Corydoras aurofrenatus* Eigenmann & Kennedy.

PLATE XXXIX.

Fig. 1. *Parodon paraguayensis* Eigenmann.
Fig. 2. *Schizodon borelli* Boulenger.
Fig. 3. *Aphiocharax dentatus* Eigenmann & Kennedy.

PLATE XL.

Fig. 1. *Tetragonopterus argenteus* Cuvier.
Fig. 2. *Tetragonopterus alleni* Eigenmann & McAtee. Type.
Fig. 3. *Astyanax pelegrini* Eigenmann & Kennedy.

PLATE XLI.

Fig. 1. *Moenkhausia dichrourus* (Kner).
Fig. 2. *Moenkhausia agassizi* Steindachner.
Fig. 3. *Deuterodon iguape* Eigenmann. Type.

PLATE XLII.

Fig. 1. *Metynnis mola* (Eigenmann & Kennedy).
Fig. 2. *Myleus levis* Eigenmann & McAtee. Type.

PLATE XLIII.

Fig. 1. *Charax caliurus* Eigenmann & Kennedy. Type.
Fig. 2. *Charax squamosus* (Eigenmann & Kennedy).

PLATE XLIV.

Fig. 1. *Chætobranchopsis australe* Eigenmann & Ward. Type.
Fig. 2. *Æquidens paraguayensis* Eigenmann & Kennedy.

PLATE XLV.

Fig. 1. *Mesonauta festivus* (Heckel).
Fig. 2. *Heterogramma trifasciatum* Eigenmann & Kennedy.
Fig. 3. *Heterogramma corumbæ* Eigenmann & Ward. Type.